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ABSTRACT

This publication gives the proceedings from a 1977 conference sponsored by the Conservation Foundation. Participants discuss the appropriate means to control water pollution, emphasizing the use of effluent charges as economic incentive for polluters to clean up their waters. (MA)

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An Issue Report

PAYING FOR POLLUTION

Water Quality and Effluent Charges

The Conservation Foundation

SE 025 156

PAYING FOR POLLUTION
Water Quality and Effluent Charges

Proceedings from a conference sponsored by The Conservation Foundation in Chicago, Illinois, on May 19, 1977.

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WASHINGTON, D.C.

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PAYING FOR POLLUTION
Water Quality and Effluent Charges

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Contents

Introduction by William K. Reilly 1

Assessing the Federal Water Pollution Control Program 5
William D. Ruckelshaus

Discussion 11

Effluent Charges as an Incentive Mechanism for Improving and Maintaining Ambient Water Quality 14
Blair T. Bower

Discussion 25

The Politics of Pollution Charges 28
Russell E. Train

Discussion 34

Effluent Charges—A Change for the Better? 37
Richard L. Robbins

Panel Discussion
Practical Opportunities for Employing Effluent Charges 42
George Alexander

A Limited Case for Effluent Charges 44
Clifford Russell

Effluent Charges Based on Damages 46
Jack Carlson

Effluent Charges to Penalize Industry Delay 48
Robert T. Hayden

Discussion 50

Connecticut's Experience with Noncompliance Penalties 56
Douglas Costle

Discussion 58

Introduction

July 1, 1977, was the first deadline established by the sweeping Federal Water Pollution Control Act Amendments of 1972 (PL 92-500), the ambitious law that determines the nation's water quality goals and proposes means of complying with them. By mid-1977, all industrial point sources of pollution were to have installed "best practicable technology" to cleanse the effluents they discharge into the nation's waterways—and a majority of the companies were in compliance with this requirement. Municipal treatment works and other public facilities were to have installed secondary treatment facilities; thus far, public installations lag far behind industrial polluters in meeting the requirements of the law.

The problems of implementing the law to date have been formidable. Issuing permits detailing the performance required of industrial discharges has proven cumbersome and difficult. Compelling municipalities to comply has been even more trying. No one is really sure what effects compliance with the permits will have on water quality.

These difficulties and the anticipation of greater ones to come, as the nation moves toward the 1983 goal of installing "best available technology" (BAT), have led many observers to raise the issue of how we might better implement the national goal of attaining improved water quality. Some critics allege that technology-based standards relate in no way to the actual quality of water moving in streams and rivers—the variation in water volumes with the seasons, changes in production schedules and processes, and other factors determine water quality more than do any "black boxes," effluent-cleansing technologies tied on to discharge pipes. Others focus on the enormous costs involved in requiring all dischargers to install technology, and suggest that some dischargers might more effectively and inexpensively than others carry the burden of improving ambient water quality.

And of course there are numerous complaints about the regulatory means relied upon in PL 92-500 to bring about cleaner water. Regulations appear to guarantee that, by a date certain, a desired change in behavior will have occurred. Increasingly often, however, the American people have come to believe that regulations cannot ensure equal job opportunity or safe workplaces or clean water. Regulations can be written in such a way that they stand up in court, but do not reflect the actual situation in a factory or a municipal treatment plant, so they are difficult to apply, or can be applied only in a corrupt way. Regulations can engender unanticipated side effects; many critics of the water law suggest that it "froze" technology, committing cities and industries to costly investments in waste treatment plants, rather than encourage changes in production processes that could minimize or eliminate pollution and help to recover valuable natural resources. Finally, regulations are promulgated in an adversary manner that produces litigation and threats of closing down factories or of mounting environmental protests; in such an atmosphere, the facts can be lost sight of, and social goals subverted. Once regulations are established, the difficult process of creating them militates against revising them to reflect changing circumstances in the environment, so their effect of "freezing" technology is enhanced.

To improve upon the current regulatory procedure, many economists have long urged that we consider a less legalistic approach toward pollution control. They have advocated "effluent charges," fees levied on the discharge of undesired contaminants into the waterways, as a means of inspiring businesses and communities to clean up their effluents. In theory, charges, properly set, would provide a continuing economic incentive to reduce pollution, unlike the existing regulations, which set strict limits that must be met but encourage no further improvement. Effluent charges would provide a continuing incentive for managers to invent new production processes and technologies that would result in the generation of fewer residuals in the first place.

"Effluent charges would provide a continuing incentive . . . to invent new production processes and technologies . . ."

Much of the theoretical work on effluent charges began at Resources for the Future, in Washington, D.C. The idea has attracted increasing public interest in recent years, with the 1974 publication of a favorable report by the Committee for Economic Development entitled "More Effective Programs for a Cleaner Environment." In 1975, the Brookings Institution published *Pollution, Prices, and Public Policy*, by Allen V. Kneese and Charles L. Schultze, now chairman of President Carter's Council of Economic Advisers; the book helped to introduce a critique of existing environmental laws and proposed applications of economic incentives to air and water pollution problems to a wide audience.

Kneese, Schultze, and the other advocates of effluent charges considered a charge system to be a substitute for a system of legally established air or water quality standards. However, recent attention also has turned to the use of economic incentives to encourage compliance with standards. Federal, state, and local governments have long provided tax breaks for pollution control equipment, but this approach has not been notably successful. In 1974, the State of Connecticut enacted a noncompliance charge system, which allowed the state pollution control agency to administratively levy a fine against polluters. The amount of the fine is equal to the amount the

"Thus the economic incentive for a polluter to delay compliance is taken away."

polluter saves by not installing required controls. Thus the economic incentive for a polluter to delay compliance is taken away. Congress has been considering including this type of charge system in the federal air and water pollution control statutes.

Recognizing the gathering interest in effluent charges, The Conservation Foundation convened a conference in Chicago on May 19, 1977, at which the most articulate advocates of effluent charges could meet with environmental leaders, businessmen, and administrators skilled in using the existing water pollution control law, to discuss applying effluent charges to water pollution problems. The discussion took place in the context of the approaching July 1, 1977, deadline for the first phase of PL 92-500, and with the recognition that Congress would soon be engaged in reconsidering the entire law, allowing for some "mid-course corrections" reflecting experience with its provisions.

The conference provided interesting differences of opinion, and helped participants focus on the limited but genuine opportunities for employing effluent charges. For the first time, all three former and present administrators of the Environmental Protection Agency appeared on a program together, and presented widely varying views of the water pollution control program. William D. Ruckelshaus reviewed the existing law, and attacked its 1983 BAT requirements; he urged the adoption of recommendations by the National Commission on Water Quality that the BAT requirement be dropped because of its excessive cost and limited relevance for improved ambient water quality.

Russell E. Train defended BAT, and discussed, in the context of previous efforts to interest Congress in effluent charges, the opportunities for improving implementation of the law using charges. Douglas Costle, current administrator, drew upon his experience in Connecticut, where he devised a system of noncompliance penalties to force polluters to meet regulated standards or to forego the economic advantage they might gain from delaying compliance. He suggested that he and the Carter Administration are broadly sympathetic to such innovations in federal law.

Blair Bower, a pioneer in developing the effluent charge concept, explained the general nature of the problem of "residuals" being dumped into the environment, and explained some of the advantages of effluent charges. His ideas were elaborated upon in a panel discussion, and in questions from the audience. George Alexander, regional EPA administrator, explained some of the enforcement problems he thought might be eased by having penalties for noncompliance. Clifford Russell of Resources for the Future made a limited case for effluent charges, stressing their unique role in stimulating innovation to discover better ways of producing goods and services with diminished pollution, but also pointing out several problems and limitations of a charge system.

Jack Carlson, of the Chamber of Commerce, and Robert T. Hayden, of the United Steelworkers, clashed sharply over the use of effluent charges. Carlson advocated a system of charges based on the degree of damage caused by pollution to society and individuals, but rejected as inflationary any noncompliance fee. Hayden expressed his pref-

erence for regulations, his concern that effluent charges become "licenses to pollute," and his support for noncompliance penalties. The ensuing discussion revealed the practical difficulties of establishing a charge system based on damages in place of regulations, and elicited broad support for more limited use of noncompliance penalties to remove the incentive to delay complying with regulations.

The liveliness and importance of the discussion suggested that we ought to publish the proceedings of the conference so that as discussion over reforming the water law continues, consideration of the real opportunities for using nonregulatory enforcement mechanisms might be enhanced. Hence this report.

The Conservation Foundation sponsored the conference and this report as a part of its program on business and the environment, an attempt to bring business and environmental leaders into discussion of opportunities for cooperation and mutual action. The program is principally supported by the Andrew W. Mellon Foundation, the Rockefeller Brothers Fund, and the Ford Foundation. The conference in Chicago was also aided by the First National Bank of Chicago, which made meeting facilities available, and by the Lake Michigan Federation, whose frequent work with The Conservation Foundation has enabled us to maintain numerous programs of discussion and citizen training in the region. I would also like to thank Richard B. Ogilvie, a Foundation trustee, for helping to arrange the conference; J. Clarence Davies III, executive vice president of the Foundation, for setting up the program and moderating the panel discussion; and John Rosenberg, formerly on the Foundation staff, for editing the conference transcript.

William K. Reilly
President
The Conservation Foundation

Assessing the Federal Water Pollution Control Program

William D. Ruckelshaus

The subject of this conference concerns not the end of controlling water pollution but the appropriate means. The topic is particularly germane now because Congress is reviewing Public Law 92-500, the Federal Water Pollution Control Act Amendments of 1972 (FWPCAA). Every reasonable American by this time agrees to the end represented by the law—that it would be a good thing for our country to have water available for whatever use we want to make it. To achieve that goal, we must act to ensure that these beneficial uses can be fulfilled now and in the future.

There really is no serious continuing argument in the society over the desirability of attaining clean water, whether it is defined as fishable and swimmable, as in FWPCAA, or in some more technical language. The question is not whether, but how.

A Federal Regulatory Control System

To understand the different means of pollution control under discussion, we need some background on existing water pollution law. In general, America relies upon a standard-setting enforcement mechanism to abate water pollution. In the past, responsibility for enforcing those standards was left to the states, with the federal

William D. Ruckelshaus is senior vice president of Weyerhaeuser Company. From 1970 to 1973, he served as the first administrator of the U.S. Environmental Protection Agency.

government lurking in the background as a monitor of state action and an occasional prod to force the states to achieve those standards.

In the late 1960's and early 1970's, as public concern about water quality and pollution increased, the federal role expanded. Finally, in 1972, the FWPCAA was passed, and the federal role came to dominate the standard-setting enforcement process.

Two important factors explain this shift in authority. First, public demand resulted in congressional action, as it usually does, to address a social problem. Congress chose to assign responsibility to achieve this social goal of clean water to a federal agency because it perceived that the states were not capable by themselves of cleaning up the nation's lakes and rivers. Congress's judgment certainly comported with my own experience in Indiana, where I was given the responsibility in the attorney general's office for enforcing the air and water laws in the early 1960's. The states were simply not good regulators of industry because they competed so strongly in attracting industries to locate within their boundaries.

"... there was simply no public demand in the early 1960's that anything be done about water pollution."

Second, there was simply no public demand in the early 1960's that anything be done about water pollution. Wherever a state statute or state enforcement action ran into some other social concern, such as jobs or the location of an industry in a given community, inevitably those jobs or industrial location won out.

New Standards

When Congress acted in 1972, it shifted responsibility to the national government. But the new law not only shifted responsibility, it also laid down new water quality standards that are the focus of debate over the best means for controlling pollution. Public Law 92-500 embodied a two- or three-phase attack on water pollution. (I say two or three because the third phase was not clear when the law passed and has not become clearer since.) Phase 1 established a standard: By 1977, all industrial point sources of polluted discharges were to install the best practicable treatment technology currently available (BPT). Municipalities were to install secondary treatment.

Phase 1 in essence created a minimum standard of pollution control, comparable to the level of cleanliness reached by plants operating within an industry that had good controls, or by municipalities that were applying good pollution control practices. Only where water quality standards necessitated it was that floor to be exceeded. Whenever application of BPT did not result in achieving the water quality desired in the stream into which the discharge was being made, a higher quality of treatment could be required.

Phase 2 set a 1983 standard, best available treatment (BAT). Under this standard, water quality would no longer be a relevant consideration; technology was to be the driving force.

Phase 3 propounded the goal of no discharge of pollutants by 1985. The Phase 3 target was changed from a standard to a goal, and no one knows what that means, but it is still in the law.

The law created two means to achieve the 1977 and 1983 standards. The Environmental Protection Agency (EPA) was to adopt effluent

guidelines defining the technological range between best practicable treatment and best available treatment. Those guidelines were then to be incorporated into permits issued to each individual discharger either by the states with some EPA oversight, or by EPA itself. These permits specified the technological achievements required, and in the case of a stream where water quality standards required that the technology exceed BPT, that was written into the permit. Violations of the permits were to be enforceable through an administrative or legal mechanism.

To judge the effectiveness of these novel standards, Section 315 of the Act created a 15-member National Commission on Water Quality (NCWQ), five of whom were to be appointed by the Senate, five by the House of Representatives, and five by the President to report to the Congress and the EPA administrator whether the 1983 standards made any sense.

By now, 90 percent of the industrial dischargers have achieved the 1977 standards, according to the report of the NCWQ. Progress by municipalities has been considerably less satisfactory. The NCWQ estimated that by 1977, 25 percent of the total sewerage in the country would be undergoing secondary treatment. Most people who have attempted to look at the problem agree with that figure. This lagging performance has been caused by the lack of assurance of federal funds for municipal treatment plants, and the delays caused by paper work and construction involved in erecting the plants.

In brief, that covers the law's requirements and its initial performance.

Shortcomings of the Law

I question the wisdom of parts of the law. Since I now work for a polluter you may rightfully ask whether I have fallen victim to Miles' Law—where you stand depends on where you sit. So I will quote from a piece of testimony that I gave to the House Public Works Committee in 1972, after the present law had passed the Senate, but before it had passed the House.

In that forum, I said that the Senate bill progressed in three stages from best practicable control technology currently available in 1976 (these dates are somewhat different from those in the present law, and were changed in Congress), to no discharge of pollutants or best available technology in 1981, to no discharge of pollutants in 1985. Thus the social benefit we were all seeking, high quality water, was eliminated from the equation and technology was substituted in its place. In completely obliterating the admittedly complex relationship between municipal and industrial effluent and water quality, it seemed to me, the Senate might have sacrificed wisdom for simplicity. Certainly it was simpler to address the problem in terms of available technology than in terms of complex relationships between treatment and ambient water quality. But it was my conviction that hiding from known complexity to simplify legislation is the essence of bad policy making.

"... hiding from known complexity to simplify legislation is the essence of bad policy making."

My views have not changed since 1972. What we recommended at the time was really incorporated in the law. We recommended that EPA establish the range between best practicable treatment and best

available treatment, that the technological range be published for people to comment on, and finally have the effect of law. Thus, in Phase 1 we would move everybody up to a technological floor. There was a certain rough equity in this. But before going beyond 1977, we should justify the additional treatment requirement on the basis of water quality needs. This recommendation was adopted in part as to the 1977 requirement, but was not adopted as part of the 1983 requirement.

In August of 1972, just before the election, I recommended to the President that he sign the law, on the grounds that the 1977 standard was precisely what we have been recommending; that there had been created a commission to review the 1983 standard; and that the commission would undoubtedly come to the same conclusion that I had, that the 1983 requirement was unwise policy.

Well, he vetoed the law and it was then passed over his veto in October of 1972. The commission was formed, spent $17 million and two years reviewing the 1983 goal and standard, and the 1985 goal, and recommended that the goal of fishable and swimmable waters not be abandoned, but that best available treatment standard be postponed for 10 years. Nobody has paid any attention to the commission as yet, so my prediction to the President has not come true.

Challenging the Present System

What do we do now? Let me ask you to make an assumption. My hope is that we can create some mechanism for testing my assumption because it is crucial to my views, and if my assumption is found to be correct, we should agree to adopt some different means of achieving our end, our goal, clean water.

My assumption is that the nation will achieve BPT, the 1977 standard. All industry will achieve it and most municipalities will achieve it. And the standard will be achieved soon, sooner for industry than for municipalities, but soon. But if we try to achieve the BAT standard for 1983, we as a society will force the expenditure of billions of dollars of private and public money, by consumers and taxpayers, for no public benefit or for a minimal public benefit.

"But if we try to achieve the BAT standard for 1983, we . . . will force the expenditure of billions of dollars . . . for no public benefit or for a minimal public benefit."

Now, if this assumption is true, why do we have a BAT standard in the first place? An argument can be made for it in terms of simplicity of enforcement. There is no question but that a technology standard is simpler and easier to enforce than a water quality standard. That argument clearly has to be dealt with when recommending some other kind of standard.

But I think that arguments against BAT have failed in the past because they have relied on macroeconomic figures. The argument against the standards is stated in terms of its total costs—the cost to industry of BAT, or the number of jobs that will be lost or the impact on inflation. Estimates of these effects vary. The NCWQ estimated $45 billion. Job losses have been estimated at anywhere from none to 400,000. The increase in the cost of goods, while certain to occur, is of unknown size.

The problem with those statistics is that they are all based on challengeable assumptions. If we take the $45 billion figure and ask

where did that come from, we find nobody really knows. The commission sent questionnaires to most American industries asking them what the cost of achieving the standard would be. The questionnaires did not contain criteria by which the respondents were to judge those costs that really made any sense, so we have a figure that is indefensible. Nor is it related to the benefits of that expenditure.

The same is true of jobs. We may well sacrifice hundreds of thousands of jobs in the industries to which the standard applies, but then a number of other jobs, perhaps more jobs, will be created in the industry that responds to the standard by producing pollution-abatement equipment or engineering process changes used in other plants.

An argument based on unemployment and inflation is equally open to question. BAT will have some effect, but so will a lot of other things. With people recognizing that the price of imported oil has quadrupled over the last four years, a 10 or 15 percent increase in the cost of goods attributable to pollution-abatement equipment doesn't get them very excited.

Most of the analyses I have seen and most of my practical experience tells me that we may well create more jobs in the effort to achieve the BAT standard than we will eliminate.

". . . we may well create more jobs in the effort to achieve the BAT standard than we will eliminate."

The question, of course, is not how many jobs will be created or eliminated overall. The issue is whether the work that is being engaged in by the people whose jobs are created by governmental mandate results in a public benefit. The essence of my assumption is that it will not.

My assumptions are not based on macroeconomic effects. They are based on microeconomic consequences for a given industrial plant using a given body of water at a given point in time, or for a municipal treatment system located in a given body of receiving water in a given section of the country.

Let two real examples illustrate my concern. There is a plant on a stream of some magnitude in the northwestern part of the country. It creates in its untreated effluent (before any standard is applied) 180,000 pounds per day of biochemical oxygen demand (BOD)—nontoxic, organic material that when discharged into the water is broken down by bacteria feeding on it. This process uses up oxygen, and if the oxygen concentration in the receiving waters falls too low, aquatic life, including fish, cannot exist. The stream standard applied is a measure of dissolved oxygen necessary to sustain aquatic life; that quantity is then related to the BOD discharged into the stream for the purpose of calculating how to maintain an appropriate dissolved oxygen level.

Applying the 1977 standard to this plant requires the manufacturer to reduce the 180,000 pounds of BOD discharged a day to 27,000 pounds per day. This improvement cost $52 million.

The stream standard achieved called for eight micrograms of dissolved oxygen per liter of water, a supersaturated level based on

the needs of spawning salmon. The effect of the pollution-control investment was to improve the receiving water by .1 micro grams of oxygen per liter.

To reach the 1983 standard, it will be necessary to reduce the 27,000 pounds a day of BOD remaining to 18,000 pounds a day. This additional reduction will cost another $50 million. The impact on the dissolved oxygen in the stream is immeasurable. You can't find any. I don't believe that results in any benefit to the public.

Similar examples can be found in treating municipal wastewater. Seattle comes to mind.

"I live on the shores of Lake Washington, one of the great success stories in the environment . . ."

I live on the shores of Lake Washington, one of the great success stories in the environment, in that some 15 years ago Seattle decided to clean up the lake. The city formed a metropolitan sewer authority with jurisdiction over all of the communities surrounding the lake. It was then a horrible polluted mess. The metropolitan sewer authority got an agreement from all the communities surrounding it, collected the sewage that was being discharged into the lake, and subjected it to primary treatment, and discharged it into Puget Sound, at a deep-water discharge point. The lake has been cleaned up. It is in magnificent shape today. Bass, trout, and even some salmon abound in its waters.

The requirement of the federal law as presently written—the 1977 secondary treatment standard—would force the city (really the nation, because 75 percent of the money comes from the general taxpayers) to spend an additional $130 to $500 million to provide secondary treatment for the sewage now being discharged into Puget Sound.

Again, there is little evidence that the receiving waters will be improved because the discharge is now being dumped in a deep-water area with very fast-moving currents. No more than three or four feet from the discharge point, there is no measurable BOD impact on Puget Sound. In fact, it was a presentation made to me in 1972, when I was administrator of EPA, by the then-director of the Metropolitan Sewer Authority of Seattle that convinced me that attempting to apply rigid technological standards, even to municipalities, made no sense, and that we had to be more flexible in our approach to the abatement of pollution if we were going to properly direct the limited resources of the country toward our social problems.

His argument then, and that of his successor, was: "If you are determined to spend this money on the abatement of pollution in my community, please let me decide how I can best spend it, because I can use this amount of money to separate storm and sanitary sewers around the city, achieving 50 times the benefit that could be obtained from that same expenditure for a rigid secondary treatment standard applying to waters going into the bay."

I believe that these examples can be repeated over and over again. Of course, there are other receiving waters where it is necessary to go beyond BAT requirements to come close to achieving any water quality standard. I think those kind of situations should be treated differently.

My conclusion now, as in 1972, is that if my assumption is right, the 1983 standard is bad public policy. For the federal government to force private individuals or state and local governments to spend large sums of money for minimal or zero public benefit makes no sense to me.

Strategies for Improving the Law

If that mechanism we have adopted is no good and my assumption is right, what do we do about it? In the first instance, we must test the assumption so that the results will be credible to those in power or those who affect the decision makers—the administrative branch of the federal government, the members of Congress and their staffs, and the environmentalists, industry, and labor.

There were written into the FWPCAA the mechanism to do just that—The National Commission on Water Quality. The commission failed. Its work has not convinced anyone in a position to affect the law that it ought to be changed.

So it is up to us to highlight some of the choices that we have for reasonably achieving the very worthwhile end of clean water. Those choices are to use the present mechanism, to refine it to achieve the same end, or to change that mechanism, perhaps using some form of effluent charge.

If I have a bias, it would be to favor using the present standard-setting enforcement mechanism, but adjusting it to comport with reality, because we know so much more about it than about a new system of effluent charges. We have years of experience with standard-setting enforcement mechanisms, not all of it good. But the one certain thing about all the systems that have been adopted worldwide to abate pollution is that none of them have worked. And the reason for their failure may be found not so much in inherent deficiencies of the mechanisms themselves, as in a lack of determination on the part of the societies that adopted them to make them work.

I believe that the system we have established to control water quality can be made to work. My question, if my assumption is right, is whether we are imaginative enough to fashion a fair, workable enforcement program to achieve our agreed upon end, clean water. I think we are.

"I believe that the system we have established to control water quality can be made to work."

Discussion

QUESTION: I think, Mr. Ruckelshaus, you touched on a basic problem of implementation—adjusting attitudes. You cannot get clean water by forcing people to act, by regulating their behavior.

How do we get water users committed to wanting to do good, to accomplish the goal, so that instead of delaying action, they want to get the job done?

"... the American people decided several years ago that we are going to have clean water, and I don't think that commitment has weakened whatsoever."

MR. RUCKELSHAUS: My sense is that the American people decided several years ago that we are going to have clean water, and I don't think that commitment has weakened whatsoever.

I also think there is an understanding, albeit somewhat visceral, among the American people that clean water or clean air or environmental improvement is much like other social problems—it has to be fitted into a social fabric.

My sense is that if there were to be a change in the law after the 1977 standard is met, some process of requiring additional technologies only as they relate to water quality needs rather than to apply whatever technology is available for its own sake, Congress and the President ought to make a determined effort to get a very visible public commitment from industry to adopt a more cooperative attitude towards achieving these goals. I think that given the evolution of thinking in most of American industry, that kind of commitment could now be gotten. With it, we would stand a better chance of getting voluntary cooperation than we now enjoy.

I used to sit in my office at EPA and remember going through exercises in enforcement, suing people and holding hearings and setting standards and deadlines, and I would occasionally wonder what was going on out there in the real world. Were the people who were running plants and operating municipal systems really asking themselves, "How can I abate more pollution? How can I make the effluent I am discharging cleaner?"

If there were some way I could get them to address that question aggressively, how much more progress would we get than through all the saber-rattling and enforcement procedures we were undertaking.

I never came to any magic solution about it. I think we have evolved sufficiently now in the law and in understanding the public attitude that we have a much better chance of achieving that change in thinking with some slight adjustments in our existing program, than by adopting an entirely new system of effluent charges.

QUESTION: You cited two microeconomic examples of instances in which society gains very little in improved water quality from a very large expenditure of money.

Are you suggesting that those two examples are probably indicative of most other situations in the country? Or are you suggesting that we need to take a close look at the impact of our nationwide policies to see if indeed your examples are representative?

MR. RUCKELSHAUS: I do not know how applicable my examples are. There may be even more extreme instances.

There are, of course, instances of the opposite sort, where the receiving waters are so delicate that it may not be possible to protect them through the application of any standard short of the stopping of discharging anything into the water. Between these extremes of no discharge and minimal benefits from costly pollution control measures, we should review the mechanism we have developed to see if we might devise a more efficient, fair, enforceable system than we now have.

If my assumption is right even in just the one plant I mentioned, the only way we can achieve a *total* improvement in water quality with the existing pollution control system is to incur what by any definition are grossly distorted costs as compared to the benefits obtained in these discrete instances.

QUESTION: Are you proposing 1977 standards plus additional effluent limitations based on water quality and stopping there?

MR. RUCKELSHAUS: Yes, I would base additional treatment requirements on water quality needs, not on technology. Any effluent charge system could be based on the same kind of consideration, relating the effluent charge to some water quality goal you are seeking to achieve.

"I would base additional treatment requirements on water quality needs, not on technology."

QUESTION: The current system for reducing pollution fails when a company that is polluting prefers to pay legal costs for years fighting the rulings in court rather than complying with abatement orders.

It seems to me that an effluent charge system that would force the company to pay for its discharges from the moment of discovery would be more likely to promote action than would a statutory limitation or regulation that the company could drag on in court for years without taking one step towards cleaning up.

MR. RUCKELSHAUS: Maybe Doug Costle is going to talk about this.* In Connecticut, he adopted a system that sought to take capital and operating expenses and break them down into a daily cost to the company; if the company did not immediately schedule abatement, for each day it missed it paid a *pro rata* fine in someway related to the advantage it gained by delaying investments for compliance. If your question assumes that the company has made a conscious decision to fight and delay rather than comply, then whatever fine is available is altogether justified as far as I'm concerned.

But we should not assume that companies do not have the right to contest the application of a given law to them if they disagree with it. Distinguishing between a conscious decision to delay and normal assertation of legal rights is not easy. That is where it gets difficult to talk about administering a system.

*See below, pp. 56–60.

Effluent Charges as an Incentive Mechanism for Improving and Maintaining Ambient Water Quality

Blair T. Bower

Informative discussion about any incentive mechanism for achieving water quality management goals requires delineation of the problem's background. This involves defining both the nature of the societal problem under scrutiny and the context in which it must be handled. After giving the background and discussing various types of implementation incentives, I will turn to more specific comments on effluent charges.

Water Quality Management

A reminder of six basic "facts of life" with respect to water quality management, and to environmental quality management as a whole, is in order. First, water quality management involves the use of surface and groundwater bodies to dispose of society's "leftovers." All human activities result in the generation of some material and/or energy residuals. No production process exists which transforms 100 percent of the inputs into product outputs; nor is there any "consumption" process which results in zero residuals generation. Therefore, there are always leftovers.

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Second, while we have tried, particularly at the federal level, to subdivide environmental quality management into water quality management, air quality management, and solid residuals management, the environment stubbornly resists such compartmentalization. Any one of the forms of residuals can be transformed into one or more of the others. Although our focus herein is on water quality management, a rational approach to such management is possible only if we recognize—and consider explicitly—the physical, technologic, economic, and ecological interrelationships among the three environmental media. Reducing the discharge of some materials and energy into one environmental medium all too often has simply meant increases of discharges into one or the other, or both, of the other media—with what may in some cases be more adverse impacts than would have resulted from the original discharge.

Third, producing and maintaining ambient environmental quality, as measured by some set of indicators, involves activities of many public and private entities. These activities include analysis; research; legislation; promulgation of guidelines; design, construction, operation, and maintenance of facilities; monitoring of ambient conditions and managing the performance of activities; enforcement, and feedback of information. *All* these activities are essential to achieve and maintain the desired objective of improved ambient environmental quality. Planning in and of itself does not produce improved ambient environmental quality, nor do legislation and standards. Environmental quality management is a continuing activity, just as is producing steel, chickens, or Big Macs.

Fourth, environmental quality management occurs in a dynamic context. The reality differs from the deterministic, static view of the world which marks much legislation, including PL 92-500. This dynamic context has two important dimensions. One is the dynamic character of society over time, as reflected in continually changing factor prices, product mix, product specifications, and social tastes. Perhaps the most dramatic of changes in recent years has been the increase in the price of energy. Failure to understand the impacts of these changing factors can lead to substantially different results than anticipated from a selected implementation incentive.

A corollary to this point is that individual decisions about residuals management are affected by many decisions and factors *external* to the individual activity. Examples include: prices of energy, water, fuel, and other raw material inputs such as chemicals, ores, and secondary materials; tax policies; freight rates; tariffs, and import/export restrictions. These factors influence decisions on the levels of materials and energy recovery and byproduct production which would take place in the absence of any constraints on residuals discharges to the environment.

The other important dimension of the dynamic context of environmental quality management relates to short-run variations, both in the generation and discharge of materials and energy to the environment and in the assimilative capacity of the environment. With respect to the former, substantial short-run variation exists under "normal operating conditions." Also, additional variation stems from start-up, shut-down, and clean-up periods and accidental spills and breakdowns. This is true for *all* types of activities, though often

ignored. Such variations must be considered explicitly in developing environmental quality management strategies, including the selection of implementation incentives, if desired levels of ambient environmental quality are to be achieved. We must not delude ourselves into thinking that we can achieve some specific ambient environmental quality 100 percent of the time. The natural systems involved in environmental quality management—aquatic, atmospheric, and terrestrial ecosystems—all have assimilative capacities which vary randomly from day to day, season to season, and year to year. These random variations may be superimposed on longer-term trends—climatic changes.

The fifth fact of life is that many activities, perhaps most, do respond to changes in prices of factor inputs. This is the basic reason why ambient environmental quality has deteriorated. The rational entrepreneur—whether a capitalist *or* socialist plant manager, or the head of a municipal public works department—will maximize his use of an inexpensive resource. The environment has been just that until recently, because no price was placed on its use. The environmental media have been free depositories for nonproduct materials and energy generated in society's activities. One can contrast the resulting impact of the zero price on the environment, in terms of developing nonpolluting technology, with the impact on technology of the continually increasing real wage costs over the last century. During that period, it has been estimated that the amount of labor per unit of output has been halved every 15 years.

Sixth, because the assimilative capacity of the environment is essentially fixed, that resource can only become more scarce in the future—relative to the demands on it—as the economy and per capita disposable income grow. Inevitably then, the price on the use of that resource will increase, just as for any increasingly scarce resource. This is true no matter how the price is reflected, that is, in effluent standards, input constraints, product restrictions, or effluent charges.

Implementation Incentives

"Implementation incentives can be positive or negative, but their objective is to induce action."

Implementation incentives can be positive or negative, but their objective is to induce action. Broadly, the desired action is to reduce the day-to-day use of the environment or to maintain the use within some specified limits in order to achieve desired levels of ambient environmental quality. The actors include not only private industry, but municipalities, state facilities, universities, individuals, agricultural operations, national park service facilities, forest service operations, etc. There is probably no more recalcitrant type of activity, in terms of failure to reduce discharges, than defense installations, although facilities run by highway commissions probably are a close second.

Note that the objective is to induce action to *achieve and/or maintain ambient environmental quality standards*. In my view that is the proper focus, both for policy and for the discussion here. Thus, the focus is on *how* to achieve ambient environmental quality targets, not on what those targets should be, nor on their desirability, validity, or efficacy.

The last decade has seen substantial agreement in the United States that ambient environmental quality needed improvement. There is, and will continue to be, significant disagreement on *how much* improvement and on what those ambient environmental targets should be. Hopefully, additional information about long-term and synergistic effects will enable modification of those targets where justified—up or down.

Charges as Incentive

"There is . . . significant disagreement on how much *improvement and on what those ambient environmental targets should be."*

The Range of Implementation Incentives

Given that implementation incentives are means to induce action, how might one classify them? I have proposed five classes. Anybody who attempts a taxonomy is going to be attacked from some direction, but I think it is useful in terms of the relation of effluent charges to the whole bundle of tools available.

The first type of implementation incentive I call *regulatory*. This means a specification by law or ordinance, a specific proscription or prescription. It may specify the characteristics of raw material input and the production process, it may specify the degree of modification of the leftovers which have been generated, such as so-called secondary treatment. It may specify product output characteristics.

A regulatory incentive may also specify the specific discharge into the environment which is permitted: The discharge may be no more than X kilograms per ton of steel produced or per barrel of crude petroleum processed or per ton of raw tomatoes turned into tomato paste. The regulatory incentive may specify that the concentration in the discharge may not exceed a particular amount. And so on.

There may be limitations of an activity in terms of location or time: Discharge may not occur into water bodies during the three months of summer season. All of these reflect what traditionally have been termed regulatory mechanisms. I prefer the word incentive.

The second class of implementation incentives is *economic*. These may be charges applied to inputs into an activity such as a tax on gasoline, a charge on each kilogram of pesticide applied in an agricultural operation, a severance tax, a charge for using excessive electrical energy. An economic incentive can be applied to an output such as a tax charge on the horsepower of an automobile or a charge on the amount of phosphate in detergents. A charge can be applied directly to the residual discharge into the environment: If you discharge suspended sediments, you will pay so many cents per each pound or each kilogram of discharge into a water body. Such charges can be applied to any number of materials, or to energy discharges at so many cents per million BTU's released into a water body.

One problem is that in considering adoption of effluent charges in some state governments, some legislators have thought about effluent charges as a fine device to generate revenue for the state coffers. This occurs, in fact, if you set the charge low enough; at a penny a pound, certainly everybody will pay the charge. You can raise substantial revenues this way, but there will be virtually no incentive for reducing discharges into the environment, and hence, no inducement to improve ambient environmental quality.

Charges as Incentive

There are other kinds of economic incentives such as grants for the construction of sewage treatment plants and rapid depreciation for pollution control equipment.

The third type of implementation incentive is what I call an *administrative implementation incentive*, which is simply an order within some governmental agency or private organization. The boss may say that from now on we are going to purchase only unbleached products. This is by fiat. The administrative incentive may be generated by external pressure, financial or otherwise. But nevertheless, it is something that occurs within an organization. Such directives are perhaps more widespread than we have thought in the past.

A fourth implementation incentive is the obvious one of *judicial incentives*, court review of administrative law and action or threat thereof, citizen suits to compel compliance, and so on.

My fifth class is what I call *educational* or *informational*. There are various ways of trying to acquaint individuals and groups in society with the implications of their activities for ambient environmental quality. Campaigns can be launched to promote saving water, showering with a friend, and so on. The more significant educational efforts consist of programs to convey both to citizens and to legislative, political, and other leaders, the problems inherent in trying to manage water quality.

"... some implementation incentives can be imposed at more than one level of government."

Although these five categories of implementation incentives are mostly self-evident, some further discussion is merited. First, some implementation incentives can be imposed at more than one level of government. For example, an upper limit on the sulfur content of fuel has been specified both by local and state governments. Similarly, restrictions on nonreturnable beverage containers have been imposed at both local and state levels. On the other hand, some implementation incentives are more relevant to one particular level of government. Requiring householders to keep used newspapers separate from other solid residuals applies to the local level; requiring automobiles produced in the United States to meet minimum fuel/distance standards is relevant only at the federal level. Some implementation incentives can be imposed incrementally at more than one level of government, such as a national effluent charge on suspended solids discharge into water combined with an additional state effluent charge on such discharges.

Second, mixes of implementation incentives can be applied to the same activity. An effluent standard in terms of mean daily kilograms of BOD_5 discharge permitted can be coupled with an effluent charge (¢/kg) on all BOD_5 discharges or on all BOD_5 discharges above a specified limit.

Third, implementation incentives imposed on one residual can have positive and/or negative impacts on other residuals and/or environmental media. An ordinance specifying limits on concentration of particulate discharges from building incinerators may force many of these incinerators to shut down with a consequent increase in solid residuals for disposal.

Fourth, many implementation incentives are not under the jurisdiction of environmental quality management agencies. Probably the clearest examples are tax policies such as depletion allowances, capital gains, severance, accelerated depreciation, and real estate.

Fifth, "administrative" implementation incentives reflect internal responses to external stimuli. That is, a public or private manager reacting to external stimuli may adopt an administrative incentive internally within the scope of his juridiction. The stimulus may be economic, as when the costs of disposing of solid residuals increase to a level that recycling used paper merits consideration. It may be a public relations move, with or without external pressure from a public interest group. It may be in response to the possibility of a class-action court suit. It may be to set an example for other governmental agencies.

It should be emphasized that an effluent charge is *not* a tax. This is an important legal distinction. The purpose of a *tax* is to raise revenues; the purpose of an effluent charge is to induce the *reduction in discharge* to the environment of the residual on which the charge is imposed.

"It should be emphasized that an effluent charge is not a tax."

Note that effluent charges and effluent standards are only two of the total set of implementation incentives. This leads to a set of questions which underlie the problem of choosing implementation incentives.

1. What implementation incentives are most appropriate for what types of residuals generated by what specific activities? Even if total suspended solid (TSS) residuals had the same environmental impacts, regardless of the source, the generation phenomena are not the same for industrial activities, mining activities, municipalities, urban storm runoff, agricultural activities. Assessing an effluent charge on TSS discharges from agricultural operations would be more difficult than assessing such a charge on an industrial discharge, but by no means impossible.

2. What stimulates a state government to carry out its responsibilities for water quality management? Is it the provision of planning funds? Is it the designation of particular types of planning areas or planning agencies? Is it the requirement of obtaining approval of plans and designs by EPA? The provision of planning funds clearly has resulted in the generation of planning documents. But to what extent have these plans been implemented and the desired improvement in environmental quality actually achieved?

3. What induces a state to stimulate activities within the state—municipalities, industrial operations, state facilities—to act? Is it the provision of grants for construction of sewage treatment plants or other facilities? Is it the provision of grants for operation and maintenance? How can the states be induced to do a more adequate job of monitoring the activities of dischargers, and of enforcing whatever constraints are imposed on them? How can the federal government measure the performance of the states, and the states, in turn, measure the performance of lower levels of government?

4. Even if physical measures to reduce discharges are installed, what incentives are there to induce operation and maintenance of these over time? Operating such facilities involves costs; any reduction in operation and maintenance for any activity—industrial, municipal, or

agricultural—reduces costs to that activity. Because there is no net gain to the activity from reducing the discharges of its residuals, particularly if the beneficiaries are downstream, there is no *internal* incentive to operate facilities efficiently. How can pressure for continued performance be maintained?

5. Considerable variation exists in residuals generation over time in most activities, even under normal conditions. What are the most efficient implementation incentives to reduce the variability in discharge as well as the mean discharge of residuals?

6. What implementation incentives can best adapt to the dynamic context of environmental quality management, for example, continual changes in technology, factor prices, social values, increasing relative scarcity of assimilative capacity?

7. Does the implementation incentive bias the selection toward a particular residuals reduction technology (physical method) or does it stimulate investigation of the entire range of existing and new alternatives, not only in relation to residuals modification or handling, but to altering factor inputs, product output specifications, production processes, materials and energy recovery, and other technologies?

8. To what extent does the problem of implementation incentives differ for competitive industries, regulated industries, monopolistic industries, oligopolistic industries?

9. What implementation incentives can be applied in the various inter-institutional (inter-governmental agency) contexts which exist—EPA vs. National Park Service, EPA vs. municipality, state vs. municipality, state vs. sanitation district, EPA vs. Department of Defense, state vs. federal installation, state vs. National Forest Service activity?

10. What implementation incentives induce environmentally sound practices over the long run? Regulation tends to induce relatively simple, short-run, easily identifiable actions; economic incentives encourage fundamental changes in technology, organization, and behavior, that is, the discharger continues to pay for the use of the environment as a factor input, as opposed to the situation with effluent standards where nothing is paid for the use of the environment after a certain level of discharge reduction is achieved. Fundamental changes in product output specifications, for example, are more likely to be stimulated by economic (market) incentives than by fiat.

These questions suggest some criteria by which to evaluate various implementation incentives. But before assessing effluent charges as an incentive mechanism in relation to these criteria, three points common to all implementation incentives must be emphasized.

First, given that the objective is to achieve ambient water quality standards, the first requisite for the application of any implementation incentive is to know how much reduction in discharge—from *all* relevant sources, point and nonpoint—is necessary to achieve the agreed-upon ambient water quality standards. This in itself is no trifling task, but requires *in each case* a model of the natural aquatic system which will enable a reasonably accurate estimate of the time and spatial pattern of ambient water quality resulting from any given pattern of residuals discharges into the water body. Without such a model it would be highly difficult to select an implementation incentive or a set of implementation incentives which would rank high on such criteria as efficiency, effectiveness, or flexibility.

"... the first requisite ... is to know how much reduction in discharge ... is necessary to achieve the agreed-upon ambient water quality standards."

Charges as Incentive

It bears emphasis that the rationale espoused by some for passage of the Federal Water Pollution Control Amendments of 1972 (PL 92-500) was that water quality management based on ambient water quality standards had not worked. Therefore, the strategy for water quality management was to be shifted to focusing on discharge (effluent) standards. PL 92-500 has been characterized by some people as accomplishing this shift. But this claim is a misinterpretation. PL 92-500 specifically states that, where BAT is *insufficient* to achieve ambient water quality standards, additional discharge reduction "above" BAT will be necessary. In the first evaluation of water quality reaches around the country, after the act was passed, about half of the reaches were estimated to be "water quality limited" rather than "effluent limited," meaning that discharge reductions *greater* than BAT would be necessary if ambient water quality standards were to be achieved. How much additional discharge reduction is necessary can only be determined by using a model of the aquatic system.

It appears that an implicit assumption was made by many individuals and some groups that achieving the BAT discharge standards specified for *point* sources would mean that ambient water quality standards would be achieved. Such an assumption was naive. In some areas, ambient water quality standards would not be met even if *zero* discharge were achieved by *all* point sources. In other areas ambient water quality standards can be met by achieving BPT discharge standards for point sources. If BPT/BAT were not conceived for the purpose of achieving ambient water quality standards—presumably the goal—then the interpretation is that reduction of discharges is good in and of itself.

Second, whatever the implementation incentive, its effectiveness will be nil if the following do not exist: Monitoring of performance, that is, discharges by activities; random, unannounced inspections of the accuracy of the flow metering, sampling, and water quality analytical techniques used by the discharges; and sanctions for noncompliance. If nothing happens to an activity when, for example, its effluent standard is exceeded or it does not pay its effluent charge, any implementation incentive will not be effective.

Third, prohibition of discharge appears to be the only viable approach, at present, for dealing with toxic substances. The major problem is defining what amounts of what residuals discharged—alone and in combinations—are toxic to what species. As with other implementation incentives, prohibition of discharge requires a system of monitoring and the application of significant sanctions for noncompliance.

". . . prohibition of discharge appears to be the only viable approach . . . for dealing with toxic substances."

Criteria for Evaluating Implementation Incentives

At least five criteria are important for evaluating implementation incentives: 1) *Effectiveness*: Does the implementation incentive actually induce the action desired, that is, a continuous reduction in the use of the assimilative capacity? 2) *Efficiency*: Does the implementation incentive induce a response which requires the least possible use of resources? 3) *Flexibility over time*: Can the "numbers" assigned to

the implementation incentive be easily changed over time as conditions change, that is, technology, social tastes, new knowledge, new discharges? 4) *Short-run flexibility*: Can the implementation incentive be structured so as to induce action to reduce the upper end of the discharge probability distribution? 5) *Impact on technological change*: Does the implementation incentive provide a continuing stimulus to search for technology that puts less strain on environmental resources?

Before commenting on these five criteria in relation to several types of implementation incentives, three pertinent points with respect to effluent standards merit comment. First, a discharge or effluent standard for an activity which permits a discharge greater than zero is—in fact—a permit for the *free* use of some of the assimilative capacity of the common property resource of the water environment. Some amount of an essential factor input is being obtained by the activity at zero cost. This may or may not result in adverse impacts on ambient water quality. But it is important to be clear on the nature of effluent standards.

Second, some—perhaps many—dischargers who have been discharging residuals to water courses for many years take the view that, in effect, they have obtained a "right" to such free use of the water course. This is analogous to the appropriation doctrine of water rights. They then view the establishment of any constraint—effluent standards or effluent charges—as an infringement of their right, a "taking" without compensation. Without commenting on the validity of this view, it is important to recognize that it does exist.

". . . there is little evidence to date on what type of monitoring or inspection system is necessary to make effluent standards effective."

Third, there is little evidence to date on what type of monitoring or inspection system is necessary to make effluent standards effective. What frequency of unannounced random inspections is required to ensure that some specified standard is exceeded only for a given percentage of time? Should the accuracy of reported discharges be specified? At what cost? How does this relationship change with the complexity of the residuals generating activity? The complexity of the residuals stream?

Effectiveness—Given that the objective is to reduce discharges to the water environments, making a grant for 75 percent of the capital cost of constructing a sewage treatment plant or providing a special depreciation allowance for capital investment in a sewage treatment plant may well provide incentive for pouring concrete. But no incentive is provided to operate the plant after construction. It is reasonable to assume that enterprises—public as well as private—evaluate the costs of noncompliance and of compliance and generally choose the least-cost option. Even with a 75 percent federal grant for construction, a municipality is still better off financially if it does not operate the plant, thereby not having to incur operation and maintenance costs. Even high-priced lawyers are likely to be less expensive to a private activity than constructing and operating discharge-reduction facilities. If the probability of incurring sanctions for noncompliance is very small, there is little incentive to operate facilities adequately.

An effluent charge, on the other hand, produces a continuing incentive to reduce the use of the environmental resource. Having to pay for each kilogram or million BTU discharge creates a continuing incentive for an activity to assess its combination of factor inputs, realizing that if it doesn't reduce its use of the environment, it will have to pay for it. Once this process is begun, the activity will find its operating costs rising as its output increases unless its use of the environment diminishes, much as rising fuel costs have forced activities to search for methods of conserving energy.

Charges as Incentive

"An effluent charge . . . produces a continuing incentive to reduce the use of the environmental resource."

Effectiveness also relates to how rapidly a response is induced. There is ample evidence to show that most activities will respond to price signals, and if those price signals are high enough, the response will be relatively rapid. The notion that it takes a long time to achieve some response in the industrial sector, at least, is a myth, as behavior has shown very clearly in response to increased energy prices since late 1973. Once it is announced that the effluent charge for BOD_5 will be 15 cents per kilogram beginning one year from the date of announcement, activities will begin to consider alternatives. The same happens when a company learns of a price increase for chemicals or that labor costs will rise because of a new labor contract.

Efficiency—To determine the economic efficiency of various implementation incentives requires not only detailed comparisons of the costs to dischargers of responding to the different types of incentives, but also the administrative costs associated. Effluent charges provide more scope for the individual activity to respond in the manner which is most efficient for it than does an effluent standard, except when the effluent standard is couched simply in terms of kilograms per ton of discharge, rather than in terms of specifying equipment or procedures that must be installed. However, the effluent standard provides no incentive to reduce discharges beyond the standard.

It is clear that various incentives which reduce the out-of-pocket costs to the individual activity of reducing discharges may skew the choice of physical measure away from the least-cost measure in terms of actual resource costs. Grants and rapid amortization provisions for sewage treatment plant construction can easily have this effect, because with such incentives, the out-of-pocket costs to the activity may become less than the costs for process or raw material change, or increased materials and energy recovery, which may be *less* expensive in terms of resource costs.

Administrative costs include those relating to: 1) Establishing the "numbers"; 2) monitoring, inspection, enforcement, and application of sanctions; and 3) collection of fines or charges. Assuming, logically, that water quality management is a regional activity, the effluent standards approach requires establishing effluent standards for each major discharger, plus the associated self-monitoring and agency monitoring procedures for each of these discharges. With the effluent charges approach, perhaps three or four sets of effluent charges would be established, corresponding to relevant aquatic zones. Instead of having to debate, bargain, and often go to court in relation to a set of numbers for each discharger, the debate and bargaining would be done for only three or four sets of numbers.

Charges as Incentive

Once the numbers have been established, *both* approaches require monitoring and inspection systems. However, it seems probable that systems which would actually be able to detect 85-90 percent of the violations of effluent standards would have to be more extensive than those for effluent charges. For example, the payoff to an activity of "cheating" by reporting 10 percent less discharge than actually occurred, is a saving of 10 percent in effluent charges paid. However, with effluent standards and the related "penalty approach" for violations, cheating by 10 percent could save 100 percent of the penalty, given the zero-one nature of the definition of violation.

Both effluent standards and effluent charges approaches require some mechanisms for reporting by dischargers, agency review of reports, and procedures for agency actions on the basis of the reviews. With respect to the last, the effluent charges approach requires a system of billing and of collecting charges, not required by the effluent standards approach.

Flexibility over the long run—Using the existing effluent standard process, each industry guideline established by EPA must be translated into a specific permit for a particular discharger. In that category, permits generally are good for five years. As the demand on the resources increases, all of these permits presumably have to be renegotiated. If the five years is sacrosanct, a real problem arises in attempting to cope with increasing demand on the assimilative capacity of the water resource before that five-year period is over.

If dischargers in the same area were subject to effluent charges, as demand for the assimilative services grows, the effluent charges in each zone could be changed—annually if necessary. This is analogous to the annual debates in city and county councils concerning raising—or lowering—real estate tax rates. It is administratively simpler to bargain over a set of effluent charges that covers a number of dischargers than to renegotiate each individual discharge permit. (It might be noted that effluent charges, as with local real estate taxes, could be lowered—as well as increased—if it were found that the effluent charges applied to a particular water body achieved higher than necessary levels of ambient water quality.

Short-run flexibility—This relates to the problem of coping with the very substantial short-term variations in residuals generation and discharge. This problem occurs regardless of the type of implementation incentive used.

Experience is insufficient to determine how effectively either effluent standards or effluent charges reduce peak discharges, whether stemming from normal operations or from spills and breakdowns. The effectiveness of seasonal and peak pricing for electrical energy and water suggests that varying effluent charges by season and having a two-tier charge system at all times—higher unit charges above a certain level of discharge, but with different base levels by season—would probably induce significant responses in terms of reducing variability of discharges. To achieve the same response with effluent standards would likely require a completely unmanageable monitoring and enforcement system.

"Experience is insufficient to determine how effectively either effluent standards or effluent charges reduce peak discharges . . ."

Impact on technological change—Effluent standards have been characterized as "technology forcing." But what technological re-

sponses do they induce? A discharge permit which specifies installing a particular type of treatment plant—a type already in existence—is certainly not inducing technology that puts less strain on environmental resources. But if an effluent standard is expressed in terms of total kilograms of discharge permitted per day or per ton, and there are no incentives for *particular* technologies, then there is some inducement to search for new technological options. Effluent charges impact on technological change in the same manner as prices of other factor inputs. Their impact on the "bottom line" shows in each printout of costs. This puts the use of the environment on the same basis as the use of labor or any raw material input and thus provides a continuing incentive to try to find better and more efficient ways of using the resource.

Conclusion

I have three final comments.

1) Because of the dynamic nature of the context of water quality management, it is next to impossible to specify either effluent standards or effluent charges for *each* individual point and nonpoint discharger in a given reach to enable achieving *exactly* the desired ambient water quality standards.

2) Although I have talked primarily about water pollution, the discussion is equally applicable to the other environmental media.

3) Achieving and maintaining ambient water quality standards is a production process. It is a continuing activity. It involves many actors, public and private, and many activities. The production process requires physical measures if discharges are to be reduced. It requires implementation incentives which will induce the activities to use those physical measures. And it requires some institutional arrangement and allocation of responsibility for imposing those implementation incentives on the activities and to ensure performance. All three are necessary to achieve ambient water quality goals over time in the face of increasing relative scarcity of resources.

"Achieving and maintaining ambient water quality standards is a production process. It is a continuing activity."

Discussion

QUESTION: If you were a member of the Senate Public Works and Environment Committee, what would you do with regard to effluent charges this year? Where would you start? How would you proceed?

MR. BOWER: Given the realities of the situation—the choice of an implementation incentive involves political bargaining—we have to ask how we might move, perhaps incrementally, toward an improved system.

I would first suggest that we accept the so-called BPT for point sources, and apply some comparable specifications to nonpoint sources as well. This is not an impossible task, in spite of the fact that the EPA put it aside during the first three years of its existence after PL 92-500. Iowa, among other states, has passed laws which specify limits on suspended sediment runoff from agricultural operations. This can

be done physically, and there are relatively simply ways to check progress by use of aerial photos.

Therefore, I would argue that one could start with some agreement on the notion of at least minimum physical reduction in discharges from all activities in the environment.

Second, I would urge that we should pass a national effluent charge on the major residuals being discharged in the environment—BOD or COD, as the case may be, suspended sediment, phosphates, perhaps nitrogen. And, at least in most inland waters, except perhaps the largest rivers, waste heat discharges would be covered.

How would I calculate the charges? That's the next obvious question. We have great reams of material on the cost of reducing discharges to the environment from all kinds of activities. There is so much no one person could possibly go through it all. However, it does provide the raw material for getting a reasonably good estimate on what one would have to charge a given kind of activity to induce it to go beyond the BPT standard.

"... we could aim for a charge high enough ... that we know it would induce a significant reaction by most dischargers."

How much beyond? That's a good question. Nevertheless, I would argue that we could aim for a charge high enough in terms of cents per pound that we know it would induce a significant reaction by most dischargers.

A third component of my strategy would be to emphasize to the states that they were free to impose additional effluent charges on the use of the environment within their borders. If they chose to do so, their action would be designed to achieve higher levels of ambient water quality than would be achieved by the national effluent charge.

This measure recognizes that there are differences in assimilative capacity among regions, and differences in the use of waters. There is no reason to have identical ambient water quality standards all over the country. The possibility of permitting the states to set higher charges seems to me to be a logical extension of our federal system.

Now, coupled with these three proposals, I would recommend mechanisms for monitoring. Self-monitoring is the approach that I would take, and inspection of the monitoring facilities of the dischargers. And some sanctions are needed when the effluent charges are not paid. If I were on the Senate committee I would be pushing very hard to get some ingenious people to think about the kinds of sanctions which would induce the desired action on the part of the Department of Defense and the various municipalities.

This is an area to which I think we have given virtually no attention in the past, and yet it is critical. As long as actors respond very well to price signals, as the private sector does in most cases, the effluent charge is going to be effective. But if we are talking about public bodies or other federal agencies, it is not clear that effluent charges or any other incentive mechanism will, in fact, be effective. Perhaps with the Department of Defense installations you could say that for every month in which your discharge exceeds the standard, we will eliminate so many major generals, or so many second lieutenants—that would make them shape up.

Charges as Incentive

QUESTION: One of the advantages of an effluent charge mechanism is that it is flexible and compatible with a free economy. The implication is that it would be more acceptable to the public, and especially to business interests. I wonder if there's any kind of parallel to President Carter's idea of imposing extra charges on large autos, for example. Is this a parallel?

MR. BOWER: The application of effluent charges on individual residuals discharged into the environment differs somewhat from the President's proposal to tax larger automobiles.

In the former case we are making use of a well-known phenomenon: If the price of a factor input goes up, most private producers will try to reduce their use of that factor input. Effluent charges promote this reaction, and encourage producers, who know a great deal about the details of their operations, to adjust in the fastest, most efficient pattern.

In the case of automobiles, the proposed tax applies to the final product output, which will raise its price and presumably induce some consumers not to buy it.

The two phenomena are not quite the same. An equivalent might be to compare imposing a charge on all paper or steel to reduce use of those products (because paper and steel mills pollute water), with imposing a fee only on their discharges of residuals into the water.

QUESTION: What are you going to do about the smaller industries that cannot afford the charges or the capital necessary to come up with the equipment to reduce the discharges?

MR. BOWER: The obvious response to that is what are they going to do under effluent standards? Any marginal activity facing an increase in the price of a factor—use of the environment, electrical energy rates, wages, or raw material costs—is going to have a problem. I don't see that the environment differs from any of the other problems with which industry typically has to deal.

One of the criticisms raised by the private sector about incentives, particularly in discussions of effluent charges, is that businesses want some definite guideline. We want to know what we have to do. Somehow this conveys the impression that the private sector does not know how to live under uncertainty. Of course this is patently ridiculous. The private sector lives under uncertainty all the time. There are changes in prices of raw material, there are changing production processes. There is no more reason for the environment as a factor input to have an unvarying cost than there is for any other factor.

"The private sector lives under uncertainty all the time."

If I were producing something at this time, I would sure be looking at the increasing cost curve for energy. I think any rational entrepreneur is going to be doing the same thing in terms of environment, no matter what the size of his firm.

The Politics of Pollution Charges

Russell E. Train

I have been personally interested in effluent charges for several years. In fact, on my last appearance before a congressional committee, the Senate Public Works Committee, on January 19, 1977, I strongly urged the Congress to give much greater attention to the use of economic alternatives in environmental management. Three examples of proposed charges on the use of environmental resources should provide some perspective for this discussion of the practical and political considerations affecting adoption of a charge system.

When I was chairman of the Council of Environmental Quality (CEQ), we promoted development of a sulfur oxide charge, which the President proposed to the Congress in his environmental message of February 1971. The technical details of that proposal were carefully worked out over the next year with the Treasury Department. The detailed legislation finally submitted in 1972 enjoyed broad support not only from the CEQ and EPA, but also from agencies such as the Department of Commerce and the Council of Economic Advisors, and from citizen environmental groups which traditionally had regarded any program of economic charges as licenses to pollute.

Given such unusual breadth of support for an environmental program, it was particularly unfortunate that the Committee on Ways and Means never gave the proposal serious attention. This lack of

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Russell E. Train, now a senior associate of The Conservation Foundation, was administrator of the U.S. Environmental Protection Agency from 1973 until January 1977.

congressional consideration then and later was undoubtedly encouraged by a marked lack of enthusiasm on the part of the Treasury staff. The Treasury has discouraged the use of tax-like measures for purposes other than raising revenues. (I share this bias except when it comes to environmental matters.) When President Nixon reiterated his support for the proposal in the next Congress, the Treasury never even transmitted a bill to the Congress.

None of the committees with jurisdiction over environmental legislation in either the House or the Senate ever showed at that time, at least, the slightest interest in the proposal. Thus the sulfur emissions charge died.

In retrospect, I suspect that the proposal finally agreed to by the Treasury was overly complicated, so it probably is just as well that it was not enacted. But I still think it would have served a very useful public purpose if it at least had been debated in Congress.

The second serious proposal for implementing a charge system with which I am familiar occurred in 1970 and again in 1971. It concerned a charge on the lead in gasoline, designed to provide an incentive above and beyond existing regulatory requirements to ensure the general availability of unleaded gasoline needed to use catalytic converters in auto emission control systems which were expected to be installed by the 1975 model year.

Unlike the sulfur oxide charge, the lead tax proposal was considered by the Congress. In the final analysis, however, the legislation was not reported or enacted.

Finally, there has been increasing interest in the use of economic charges to control solid waste. Both Oregon and Vermont instituted beverage container deposit legislation and successfully implemented those programs. Two other states, Michigan and Maine, have recently adopted mandatory deposit legislation. In 1976, EPA issued beverage container deposit guidelines which will be mandatory on federal facilities.

While Congress has shown little interest in such legislation, I continue to be a strong believer in a national mandatory deposit system. An EPA study required by the Resource Conservation and Recovery Act of 1976 will examine the concept of a solid waste product charge consisting of an excise tax on certain consumer products and packaging.

Political Obstacles to Effluent Charges

Experience with these earlier proposals suggests some of the reasons for the lack of active congressional attention to economic charges as an approach to environmental management.

There is a traditional disinclination among tax experts to use "taxes" for nonrevenue purposes. This disinclination, of course, tends to be less apparent when a tax reduction such as a depletion allowance or a special tax credit is allowed.

There are jurisdictional issues dividing congressional committees with responsibility for taxation from those with responsibility for environmental protection.

There is the bias of legislators, many of whom have legal backgrounds, which favors approaches utilizing statutory and regulatory standards and enforcement through the courts.

Finally, there has been a tendency on the part of the proponents of economic incentives to theorize about their general advantages rather than to develop specific practical proposals dealing with real problems.

The major economic argument, of course, is that if polluters were charged a fee for use of the environment equal to the damages caused, they would have an immediate economic incentive to use all emission controls or effluent controls which are less costly than the damages caused society by the pollution. In economic terms marginal costs of pollution control would equal marginal benefits of pollution reduction.

In theory such a program would impose lesser control costs than would regulatory programs, because there would be more control by polluters with low abatement costs and less by those with high abatement costs. Some studies have indicated that such a system can reduce control costs needed to reach a given ambient level of pollution to half or less the costs involved in existing abatement programs.

These appealing arguments are overcome by two powerful constraints on the ideal effluent charge mechanism. First, such optimal charges presuppose an ability to set an emission or effluent charge at a level equal to the damages to society from each polluter's waste. The fact is that we simply do not have that ability at the present time. The facts are not available.

Second, the advantages of substantially lowered overall control costs, which I have described, would exist only if the economic charge approach were used *instead* of a regulatory approach. Where charges are used to supplement existing regulation (the sulfur oxides emissions charge was so designed), the aggregate cost of control to achieve a given ambient air quality level could well exceed the costs of complying with regulations alone.

I strongly doubt, given the existing commitment to regulatory approaches, that we can seriously expect a significant substitution of economic charges for the regulatory systems already in place. No matter what the theoretical economic advantages may be, the disruption and loss of momentum which would result from an abandonment of existing regulatory systems would be intolerable and unacceptable in my opinion.

"I strongly doubt . . . that we can seriously expect a significant substitution of economic charges for the regulatory systems . . ."

From a practical standpoint, therefore, I tend to find the claimed economic advantages of a charge system to be overstated, both because of the inadequacy of the data upon which charges can be set, and because it is extremely unlikely that charges would be substituted for existing regulation.

Practical Uses of Effluent Charges

Politics of Charges

". . . I see significant practical advantages in the use of charges in certain situations."

Having said that, let me state that I see significant practical advantages in the use of charges in certain situations.

Three cases might illustrate the possibilities for improving enforcement and administration through discrete use of charges. One has already been written into law and the other two hold promise of being addressed by Congress in the near future. These are fuel efficiency standards for autos, nitrogen oxide emission standards for autos, and charges for delay in attaining standards under both the Clean Air Act and the Federal Water Pollution Control Act Amendments.

The fuel economy standards already enacted by Congress provide a charge for each car that violates fuel economy standards. The charge would be proportional to the extent to which that model violates those standards. This approach appears particularly appropriate where a scientifically determined health standard is not involved, and the desired goal is simply to provide a strong push toward improving efficiency in using a resource.

In the case of auto emissions, I suggested some while ago that an economic charge be applied to nitrogen oxide emissions, and I commend the new administration for making such a recommendation. Doug Costle, now administrator of the EPA, has proposed that the nitrogen oxide emission standard be set at 1.0 grams per mile in 1981, that the EPA administrator be authorized to impose the statutory 0.4 grams per mile standard for the 1983 year if he finds such a level necessary to promote public health, and that an economic charge be imposed on cars meeting the higher but not the lower standard.

Given the fact that there remains at least some uncertainty over the exact health effects of nitrogen oxides, and over the availability of the control technology to meet 0.4 grams per mile, it makes great good sense to me to utilize a system of charges as a strong incentive toward the higher levels of control.

The existing penalty for failure to attain an auto emission standard, namely, inability to ship and sell cars, is so draconian, in fact, that it tends to inhibit the setting of tough standards. This effect is heightened when the standards must be established years in advance of production and, indeed, in advance of adequate commercial demonstration of control technology. The pulling and hauling in which the Congress has been engaged over the past two years in efforts to legislate definitive auto emission standards provides clear evidence of the problem.

An additional element of uncertainty in the present situation is the exact relationship between higher levels of nitrogen oxide control and the attainment of fuel economy objectives. For Congress to mandate levels of emission control under these conditions of uncertainty is to invite on the one hand the setting of a standard at a level which can clearly be achieved, given present knowledge, thus failing to obtain the benefits of later technological developments, or on the other hand, playing a high-risk game by setting a standard which some may not be able to achieve at least without undesirable trade-offs.

The use of an emission charge as an incentive would encourage maximum environmental progress while avoiding the possibility of economic disruption.

I note from Mr. Costle's testimony of April 18, 1977, before the subcommittee of the House Committee on Interstate and Foreign Commerce, that he proposes setting the nitrogen oxide charge at an amount equal to the economic value of not complying with the more stringent standard.

Clearly, the computation of such a charge in that manner would be far simpler than trying to evaluate the cost to society of the additional pollution. Here again, I applaud the stress on practical rather than theoretical considerations.

My final example comes from the 1976 conference version of the Clean Air Act Amendments, which fell prey to filibuster at the end of the session. The bill included a provision to subject pollution sources out of compliance with regulations to a charge equal to the economic value to the firm of noncompliance.

The Carter Administration has endorsed a provision of extending compliance dates as long as five years, accompanied by a noncompliance penalty that would provide incentives for rapid compliance. I supported this approach last year as administrator, and unsuccessfully sought the approval of the Ford Administration for a similar system of noncompliance charges under the water pollution law.

Having had several years of experience as the administrator charged with implementation of both the air act and the water act, I am well aware of the possibilities of delay inherent in the regulatory process.

Any regulatory program, of course, must provide due process and opportunity for both administrative and judicial review. Those rights must continue to be protected.

". . . any major polluter with competent legal counsel can often drag out the process of review almost interminably."

At the same time, however, any major polluter with competent legal counsel can often drag out the process of review almost interminably. There is a very real economic incentive at the present time to do exactly that. Capital costs being what they are today, any deferral of investment in pollution abatement facilities is money in the bank.

A system of charges for noncompliance would help eliminate existing incentives for delay for delay's sake. Sources of pollution would continue to have every right for review of the regulatory requirements being imposed upon them, but with the sure knowledge that if they lose their cases, they do not stand to benefit financially from the mere fact of delay.

The present system can be compared to a tax system under which taxpayers could litigate their liabilities without any obligation to pay interest in the event they lost their cases. Obviously such a system would be intolerable, but it is exactly the kind of system we now have under our environmental laws.

The concept of charges for noncompliance is an example of what I consider the very real, practical administrative advantages of the charge approach as distinct from the more theoretical economic advantages usually cited.

Politics of Charges

". . . charges for noncompliance is an example of what I consider the very real . . . advantages of the charge approach . . ."

Regulatory systems built upon fixed standards with date certain for their attainment have an unavoidable rigidity about them. When that rigidity is combined with the adversary approach to problem solving, which seems to be characteristic of our society, the inevitable result is confrontation, litigation or delay, high administrative costs, and, most important of all, lack of progress in achieving environmental protection goals.

Let me review a part of the record in this light. In the 22 states where EPA has retained jurisdiction for the issuance of National Pollutant Discharge Elimination System (NPDES) permits, 4,500 industrial dischargers have requested permits since 1974. Of those 4,500, 1,200, or over 25 percent, have requested ajudicatory hearings. Over 300 of these cases are still unresolved. Some of the individual cases have required as much as 25 man-years of EPA effort to resolve over 20 months of elapsed time.

Many of these cases undoubtedly involve significant issues. At the same time, the delays involved also represented major financial savings to the companies concerned, regardless of how the cases came out. An enormous drain on EPA resources resulted, as did a disadvantage to competitors who proceeded with compliance on schedule. Americans will never eliminate our fondness for adversary action, but I believe we need to build into our environmental management system elements which contribute to progress and reduce friction. Economic charges selectively applied can help contribute to this objective.

Effluent Charges and Water Quality

My limited endorsement of effluent charges for controlling pollution leads me to see limited opportunity beyond noncompliance charges for applying the concept to water quality programs. I strongly oppose extending the 1983 attainment date for BAT under the FWPCAA. It may well be that EPA needs to give less emphasis to higher levels of control of pollutants such as BOD, but it is absolutely certain that increasingly strong emphasis must be placed on the control of toxic pollutants. Moreover, there can be little question but that the best and, indeed, perhaps the only practical approach to the control of toxics lies in technology-based effluent limitations including BAT as well as pretreatment and new source performance standards.

To abandon this approach would confine EPA's toxic control efforts to Section 307(a) which is tied to water quality without regard to either technological or economic feasibility. Enforcement could not practically continue under these circumstances.

Effluent charges cannot substitute for regulatory prohibitions on discharge of toxic substances. Nor do I consider that a system of

effluent charges directed to BOD is an acceptable substitute for existing statutory BAT requirements. Such a system would lead to a morass of problems of determining water quality and monitoring discharges, thus imposing heavy administrative costs and additional delay.

But a system of delayed compliance charges applied to BAT as well as to BPT would be enormously constructive in my view. I have already referred to the protracted adjudicatory procedures which have accompanied the BPT process. There is every reason to believe that that problem will grow worse as we move ahead with BAT, especially in the field of toxics. I would urge the Congress to consider and adopt a system of delayed compliance charges at the earliest opportunity. It is a proposal that I believe should receive the support of businessmen and environmentalists alike. It seems clear that a delayed compliance charge will substantially reduce the polluters' existing incentives to delay for the sake of delay.

"... the availability of a delayed compliance charge should also provide encouragement for the government to seek expeditious settlement of outstanding issues..."

Let me also say from my not-inconsiderable experience with these matters that the availability of a delayed compliance charge should also provide encouragement for the government to seek expeditious settlement of outstanding issues, including agreement on extensions of time for compliance.

In other words, I see all of us gaining from such a system. I think that a delayed compliance charge proposal can expedite pollution abatement by minimizing confrontation and delay.

Discussion

QUESTION: Would you propose that a system of delayed compliance charges be applied to municipal polluters as well as private polluters?

MR. TRAIN: I would think if you could get it through Congress, it would probably be a good idea. There may be some legal differences, but I have no trouble in principle with applying the same rules to both.

QUESTION: What are your thoughts on variances? When and where should variances from the charges be granted, if ever?

MR. TRAIN: Under the amendments to the Water Pollution Control Act now being considered by the House, there is a fairly extensive set of variances where reasons really beyond the polluter's control prevent compliance. I would suggest that any variances be carefully spelled out in terms of some specific physical damages or something of that sort.

I do endorse the notion that the administrator should have a lot more flexibility than he has at the present time.

MR. BOWER: Mr. Train, may I comment on your suggestion that economists propose to use damages as the basis for setting effluent charges.

I am not aware of any economist who has tried to set actual damage-related effluent charges in a particular case, nor do I think the recent literature shows any advocates of that approach. Most of us realize that we simply do not know how to calculate damages, even though the theoretical economists are wont to put nice charts and functions into textbooks.

". . . we simply do not know how to calculate damages . . ."

It seems clear to me that we would have to begin with a program similar to the noncompliance penalty you described.

That is, rather than basing charges on damages, one looks at the cost functions in a region in order to determine at what level a charge has to be set in order to induce the kind of reduction of discharges one wants to get. The key figure is responsiveness of cost-conscious actors to a charge, not the relation between damages and the charges levied.

So I think it is not correct to say that there is a proposal to use damages as a basis for establishing effluent charges.

MR. TRAIN: Thank you. I accept the correction.

QUESTION: My name is Cliff Russell; I am associated with Resources for the future.*

We are talking about four kinds of charge systems, and it is important to keep their different characteristics in mind.

One is the economist's ideal that nobody takes very seriously under which the charges are calculated to equal damages.

The second involves designing charges to make dischargers meet ambient standards. This implies scrapping the existing regulatory apparatus and replacing it with a set of effluent charges to encourage activities to meet ambient standards for air and water. These could be existing standards or new ones.

The third is one that Blair Bower recommended in response to the question about what would he do if he were in the Senate. He proposed setting charges to encourage performance beyond discharge standards. That is to say, accept BPT, work to promote achieving BPT, and then charge some fee for the remaining discharges as a constant spur over the long run to technological change.

*Mr. Russell's statement appears below, at pp. 44–45.

Politics of Charges

The fourth is the proposal that you and Mr. Costle* are recommending, using charges to penalize delay. The penalties diminish as a discharger approaches compliance with discharge standards, and disappear when compliance is complete.

So there are four systems. As an example of their different characteristics, consider the system of charges in addition to standards and charges as a delay penalty: The former focuses on the long-run problem of effecting technological innovation, the latter on the short-run problem of getting compliance.

*See below, pp. 56–60.

Effluent Charges—A Change for the Better?

Richard L. Robbins

EPA Has Problems

By mid-1976, EPA had set almost 500 effluent guidelines and had issued 45,000 plant permits. Every permit was potentially subject to dispute since EPA had to consider all types of factors—age of equipment, process changes, energy impact, economic achievability, and other criteria in setting the standards.

Charles L. Schultze said that the task demanded "omniscience" for EPA. In Region Five, we have seen some excellent responses, but not much omniscience. They have been hampered by the complexity of the regulations. The well-funded industries have stymied enforcement through continuous battles over standards and requirements. In many cases, not much has been done. The illness of the Great Lakes is continuing. The improvements are merely modest and spotty. Even the states are uninterested in taking over EPA's program.

Great Lakes are Still Polluted

Water quality is still degraded. Mercury at Kenosha is 400 percent over guidelines. PCB's are 300 percent over guidelines in fish at the same location. Lake Michigan fish are largely inedible. DDT is 200 percent over guidelines. Phosphorus inputs exceed guidelines at many locations.

Richard L. Robbins is executive director of the Lake Michigan Federation.

In Lakes Huron and Superior, sewage wastes pollute the Spanish River, Owen Sound, Thunder Bay, and Black River, Ontonagon, Marquette and Munising, Michigan. Mercury is found at Marathon, Jackfish Bay, Saginaw Bay; zinc at Harbor Beach and Cheboygan; lead in Lake Huron; nickel in the St. Mary's River; cadmium at Collingwood. Chubs in Lake Huron show elevated arsenic content. Excessive phenols appear at the St. Mary's River at Sault Ste. Marie.

Just where is the permit program on Lake Michigan? In Michigan itself, eight polluters are still violating permit conditions. They include the Hardy Salt Company, Medusa Cement, French Paper, Campbell Foundary, Penn Dixie Cement, Consumers Power. In Wisconsin, seven major polluters are not in compliance. Ansul Company has a long history of violations, Bergstrom Paper is in violation, and Consolidated Paper has an incredible history of violations. George Whiting Paper, Scott Paper, Nicollet Paper Company, and Wisconsin Public Service Company as well are in violation. In Indiana, lawbreakers include American Maize, Lever Brothers, National, Youngstown, Bethlehem, Inland, and U.S. Steel.

Should Reassess Present Methods

Clearly, the time has come for reassessment of what EPA has done and the methods used under PL 92-500. As an environmentalist whose organization is committed to "a strong, irreversible and concerted commitment from government . . . to rehabilitate and restore those areas of the Great Lakes which have been degraded, and to maintain in nondegraded conditions the remainder," I want to see workable programs. We do not want arbitrary and impossible fiats, administered by unrespected agents engendering hostility to all government regulation by ineffective rules. Effluent charges could solve some problems.

"We do not want arbitrary and impossible fiats, administered by unrespected agents . . ."

What are Effluent Charges?

Effluent charges are fees assessed by government against any discharger of pollutants—municipal, industrial, farm, residential, etc. The cost can be related to the quantity, quality, and intensity of pollutants or the cost of cleanup. Polluters might pay a fee based upon the cost of treatment (or cleanup) or the damages to the public or surrounding water users. Fees might be applied to all pollution, or only to pollution which exceeds waste discharge limits presently permitted by law. The latter is often called a "noncompliance fee." Where publicly owned systems charge polluters for effluent, the fee is called a "user charge."

U.S. federal laws and most state laws currently utilize "effluent limitations"—which legally limit the amount of each pollutant. No "charges" or fees are involved.

The objective of all methods, including effluent charges, noncompliance fees, user charges and effluent limits, is to improve water quality.

Change for the Better?

Some experts say that the present system of setting limits on pollutants, issuing permits and going to court to enforce requirements, is too administratively complex. Many recalcitrant polluters hold up administrative enforcement through continuous debate. An effluent charge is less subject to attack and permits industry to make the decision on how much control it wants and how fast.

The present system, too, is biased toward "treating" pollutants. Other methods such as changes in industrial processes, substituting raw materials, and reducing sales of items which cause pollution during manufacture might occur if effluent charges were utilized. An effluent charge can also achieve pollution control at least cost (by charging the same price per unit of emission).

Effluent charges have been unpopular because some experts think it difficult to set a price. The basis for the price can be the "marginal benefit of pollution," but this is often difficult to establish. Extensive monitoring may be required which exceeds the present monitoring. Others say when a price is levied on effluent, no environmental result is guaranteed; industry could accept the price applied to any remaining pollutants and the disposition of funds from the charge could cause problems.

"Effluent charges have been unpopular because some experts think it difficult to set a price."

Answers to these assertions compare the effluent charge with present effluent limitations. In both situations it is difficult to set standards based on costs and benefits; in both, monitoring costs are high if a thorough job is done; in both there is no guarantee of an environmental result. However, where both effluent limitations and charges are set properly, water quality can be improved.

Effluent charges are also called "positive incentives" to cut pollution below what "effluent limitations" set in present law can do. This is important because as economic activity grows, overall pollution will grow, even with individual limitations. There should be some incentive to decrease individual pollution activities. In addition, an effluent charge reduces the possible competitive advantages to a noncomplying polluter.

Where Have Effluent Charges Been Tried?

West Germany proposed an effluent charge system in 1973. Similar approaches have been used in France, Holland, Czechoslovakia, and Hungary. Vermont and Connecticut use noncompliance fees. User charges are used to limit some U.S. and Canadian pollution.

Where do Effluent Charges Stand in Federal Law?

Section 204(b) of PL 92-500 describes a system of "user charges." Grants for municipal treatments works are conditioned upon a system of users paying a proportionate share of the costs of operation and maintenance of the system. Industrial users must also pay a portion of the construction cost of the treatment works allocable to treatment of their wastes. But these are not strictly effluent charges. Since EPA can request fines against noncomplying polluters—these could be based on the effluent charge concept as well.

Change for the Better?

A system of effluent charges applied to industries and municipalities based on discharges into waterways would probably require amendment to PL 92-500, the basic water quality law. States could independently develop effluent charges, but probably would not.

Have Effluent Charges Worked?

The answers are not in yet. But there is substantial evidence that polluters will respond to pricing. User charges have already had a favorable impact.

The effluent charge might yet remedy difficulties with the present effluent limitation system. The important facts are that the charges present the potential for differing private approaches to meet pollution control objectives. The industrial response could include reducing sales of the product because of the new effluent charges built into the price, to changing raw materials, processes, or the product itself. The effluent charge also has the important characteristic of encouraging the polluter to go beyond present effluent limitations to even stricter control—when this is economically feasible.

But perhaps the charge is not enough or not effective enough. Certainly big polluters can challenge the new charge as well as they did the effluent limitations. The constitutionality of the charge can be challenged as well, but a fee like a tax is less susceptible to such challenge than an effluent limit. However, there is no constitutional or statutory history for charging for use of "common property," such as the water of the Great Lakes.

Though EPA has tried valiantly to keep guidelines for effluent limitations up to date, it may be even more difficult to keep effluent charges keyed to marginal costs to encourage improvements. And what will be the basis of these charges—cost of cleanup only, damage to health, potential damage, proven damage? Present officials say that asbestos effluent limits cannot be set because of absence of proof of damage. Will effluent charges have an easier road?

Experiment Possible

"We would propose experimenting with effluent charges."

We would propose experimenting with effluent charges. Perhaps they could be levied in a single region to test the efficiency of the process. The Great Lakes could be that region. The problem is that the national market for Great Lakes goods could be altered, unreasonably affecting regional producers. But then there are other ways to offset this effect on products—a payback to polluters on some other basis than payment amount. Or a trial based on imposition in a single industry.

Certainly, we do not need a wholesale change in PL 92-500 and the effluent limit system now. Some modest changes could give us the data on which to make a decision. Effluent limits may be effective for the 75 percent of all industrial polluters who have complied voluntarily. The other 25 percent who contribute far more than their share of pollution may require new initiatives—the effluent charge may be one of these.

Basic questions remain in selecting any alternative. Is the method likely to produce changes in water quality that enhance and restore the Great Lakes? Is that method workable and acceptable to industry? Are we using the best possible techniques at the lowest cost to the country?

Draft Bill Needs Changes

During the prior administration, a draft bill was introduced to amend the Water Pollution Control Act to provide a first step toward an effluent charge. Yet in many ways the bill needs to be improved to be more specific about how to set charges. The criterion applied—fee payable in an amount equal to the economic value of noncompliance (capital costs delayed, the cost of capital, operating and maintenance cost delayed, the duration of noncompliance)—is straightforward, but fails to consider the costs inherent in pollution-related health injury, recreation and water supply losses. Costs of alternative strategies other than water treatment options should also be considered in the charge.

There would also seem to be a need for special consideration of state capacities and interests in administering a fee program. Perhaps effluent fees should be administered and set only by the federal government to ensure uniformity and effective technical understanding.

Fees Should Apply to All Effluent

"A 'noncompliance' fee —as in Connecticut— is not enough."

Fees in any new program should apply to all effluent, rather than mere noncomplying effluents. A "noncompliance" fee—as in Connecticut—is not enough. This would move us closer to the 1983 zero-discharge position, and carry out the incentive goals in any effluent charge proposal.

Thus we suggest:

1. A review of PL 92-500, its administration and effect.
2. Widespread industrial and public participation in the development of workable means to enforce the 1977, 1983, and 1985 deadlines.
3. Strong consideration of a comprehensive effluent charge for the private and municipal use of the public and common property in Great Lakes water.
4. Ensuring that the effluent charges adopted encourage rehabilitation and restoration of our waters; that they work so that increased economic growth under stated effluent limitations does not undercut improved water quality.

The Great Lakes are a major recreational resource. We share them now with polluters who use up a precious asset. If effluent charges work for polluters, for government, and for the lakes, they ought to be adopted.

Panel Discussion

Practical Opportunities for Employing Effluent Charges

George Alexander

Drawing upon experience in administering the water pollution control program, I want to present some perspective on opportunities for using effluent charges.

Early this year, EPA Region V and the Department of Commerce sponsored a conference in Chicago on changes in production processes as alternatives to pollution control. Many participants felt that process changes might prevent pollution more effectively and inexpensively than could our present reliance upon the "black box" technology that could be put on the end of the discharge pipe to treat effluents.

George Alexander is administrator of Region V, U.S. Environmental Protection Agency.

I think the message of that conference is probably applicable to a conference on effluent charges. The present system of controlling water pollution encourages installation of "black boxes" through tax incentives, but gives very little incentive to adopt new processes that do not produce pollutants to begin with or that reuse them. This may be a situation in which some type of effluent charge system would encourage the use of new processes, rather than continuing to discourage them as the present system does.

Other discussions at that conference referred to the possible use of delayed compliance fees. In order to restore equity between dischargers which have cleaned up on time and those which have not, such fees would be very desirable. I think the same thing ought to apply to municipalities. We find that industry's compliance is superior to that of municipalities. Perhaps the delayed-compliance fee would improve the rate of compliance and do so more fairly.

Effluent charges might be helpful in coping with a third problem. In the course of implementing the water program, we find ourselves promoting the use of very advanced technology. In some cases, even though the technology is coming onstream, it is not known whether it will result in cleaning up discharges to the desired degree, no matter how costly the investment.

The steel industry provides an example. In dealing with pushing operations at coke oven batteries, we have found it difficult to persuade industry to install what we consider to be the best available control technology. The usual excuse—and I have some sympathy for it—is that the technology is new. Because the industry is not sure that the equipment will work, it resists installing it because, industry argues, if the equipment does not achieve the emission limitations EPA wants, EPA will compel the firms to do something else, to make additional expenditures.

Given a system of charges, we might be able to ask firms to install the technology and operate it as well as it can be run, because EPA thinks it will enable the plant to meet the emission limitations. But if it did not work, then for every unit of excessive emissions, EPA would assess a charge until the limit was met. Once the technology began operating in the best possible way, EPA would argue, the plant should be in compliance, and the charge would disappear.

I think that this mechanism would probably provide a sufficient incentive, if the price were set right, to encourage industry cleanup to the extent possible.

In this context, you will note, it is our opinion that effluent charges could be useful but should not replace our present system of emission and effluent limitations. We think the present system works well. I only suggest that there might be some limited uses for effluent charges to improve our performance.

A Limited Case for Effluent Charges

Clifford Russell

Public discussion of effluent charges has been dominated by two extreme, polar positions. Our interest, I think, lies somewhere in between.

Some proponents of effluent charges insist that it is possible to design a charge system to meet any desired ambient quality standard. Setting up the system involves little cost because little initial information about polluters' costs will be needed: The "correct" level of the charge, and correct is the important word, can be found by a process of trial and error, largely immune from "political" influence. The resulting system will cure the problems of delay encountered under the current regulatory approach.

At the other extreme, some people insist that setting up an effluent charge system would require very much larger quantities of information than would a regulatory system designed to achieve similar ends. Administering and enforcing an effluent charge system will require continuous government monitoring of every residual from every discharger. And it is unlikely in any case that dischargers will react to charges since they do not really try to minimize costs (as economists assume), they can pass the charge through to consumers who do not care, or they are simply perverse.

Both positions, in my opinion, are equally wrong, and the fact that the public debate about charges has often resembled the views I've just sketched means that more heat than light has been generated.

I would like to suggest a few propositions to get the debate on firmer ground.

The first proposition is that economy in the need for information (as in a trial-and-error system) is in almost all situations incompatible with economic efficiency, at least in the sense of meeting ambient standards at least cost.

Clifford Russell is head of the Institutional Research Unit, Resources for the Future, Washington, D.C.

The second proposition is that there are reasons to expect that effective monitoring requires about the same level of effort under any implementation system—effluent charges, effluent standards, or effluent standards based on technology. The use of self-reporting is probably the best mechanism, and is the one now being used.

The third proposition is that any time decisions are made involving implicit property rights in the environment, politics by definition becomes involved, and the process will be intensely political.

For any kind of instrument of public policy, like effluent charges, we can choose where the political battles will be fought and how they will be defined. If we are talking about an effluent charge which is designed in some sense independent of ambient standards, then we can expect a political battle about how large the charge will be. We can choose whether the battle will be fought in Congress or in state legislatures or in executive agencies, but we cannot avoid the political battle.

The fourth proposition is that the usefulness of an effluent charge instrument in ending or significantly reducing enforcement delays depends on several questions that I as an economist am not qualified to answer. I raise them because I think others may have disregarded them.

The first problem concerns how each individual charge is levied. Will it be seen as an individual administrative action by EPA or whoever sets it, and subject to challenge as arbitrary and capricious? Or can a system be devised so that each charge is somehow tied into a larger scheme and is not itself subject to challenge? Would solving this problem require adoption of a uniform charge over all polluters?

The second problem is whether the charge runs during the period of challenge. Most advocates of this use of charges assume that they will run, but perhaps they could be enjoined by challenges to the law on the part of affected dischargers. This obviously would affect the degree to which the charge promotes compliance. How this question will be answered is uncertain.

There is a final question. To what extent is delay attributable to sheer stubbornness and bad faith? Is some delay due to legitimate pursuit by businesses of their rights under American law? We have a system that is set up, admirably, to make it hard for the government to impose costs on private parties. The fact that the system works very well to keep the government from imposing costs on private parties should neither surprise nor scandalize us. There may be people, businesses, and communities acting in bad faith, but we cannot assume that they all are, nor that all the delays we observe are due to bad faith.

"Is some delay due to legitimate pursuit by businesses of their rights under American law?"

Given these propositions, or constraints, it seems to me that there is only one unambiguous advantage of effluent charges. This crucial advantage, available only from a charge which runs continuously so long as discharges are being made, is that it provides a continuing and constant spur to innovation. Used in this way, effluent charges lead toward the development of new technologies for recovering by-products or wasted input, or in other ways, reducing discharges into the environment.

Effluent Charges Based on Damages

Jack Carlson

In the mid-1960's, I coordinated a task force developing the Water Quality Act of 1965 and the Air Quality Act of 1967. At that time I was supporting an effluent fee system based upon damage.

I hoped to help create a system of fees set to charge polluters, in the aggregate, for the sum of their damage to individuals. To establish such a system would enable policymakers to take into account the seasonal variations in water levels and flows. It would enable policymakers to encourage people to abate pollution where the cost of abatement was least, so that not every firm would reduce its discharges by the same amount. Finally, the system would provide an incentive so industry could choose to abate pollution at the end of the production process, within the production process, or before the production process (by altering input factors used in manufacturing).

The system had marvelous incentive effects. In our best judgment at that time, even though the analysis was crude, we could achieve the desired levels of abatement at one-fourth to one-tenth of the cost of other pollution-control programs.

In any event, effluent charges were not adopted. We relied instead upon a regulatory process that could not take into account the seasonal variation of stream flows, the assimilative capacity of rivers, or the possible advantages of relatively inexpensive process changes. Instead, the regulatory mechanism tends to give strong encouragement to best available technology installed only at the end of the production process. This bias has made the cost of achieving a given level of environmental quality much more costly than it would be using effluent charges.

I have often wondered why I was not able to win support for the effluent fee system. People invariably called it a license to pollute, even though we know that when something becomes scarcer, it has a

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Jack Carlson is chief economist of the Chamber of Commerce of the United States.

higher price. Both consumers and businessmen tend to minimize use of a charge system. We were not even able to establish an experimental effort in one river basin. Congress would have nothing of it. With both the business community and the Sierra Club as well as other groups pushing for a regulatory approach, the charge system was not politically palatable.

In the ensuing 10 years, I have learned that ignorance of its effects is one of the reasons we have not adopted an effluent fee system. This ignorance results from the background of many decision makers responsible for environmental policy.

As a general rule, lawyers set these policies: 67 percent of senators are lawyers and 57 percent of representatives; many administrators in environmental quality programs have been lawyers.

But legal education does not necessarily give a person an appreciation of how a market mechanism and an effluent fee system can work.

Support is gathering today for another use of charges, as a punitive device, a delay fee imposed upon those who have not complied with water laws.

Applying such a charge to industrial polluters in addition to regulatory requirements would be a mistake. The courts are sorting out those who are delinquent. Because the additional charge would not change the courts' role, nor would it apply to all polluters (thus efficiently reducing the cost and accelerating the rate of pollution abatement), it would tend to be another tax passed on to the consumer. The effect would be only to increase inflationary pressure, compressing wages slightly. There might also be more serious effects in terms of employment in particular firms or groups of firms

"Applying such a charge to industrial polluters in addition to regulatory requirements would be a mistake."

Such charges would also tend to siphon off funds for investment if paid and not rebated when those firms purchased pollution-control technology. Because they would have fewer funds, the firms might be forced to postpone their purchases of the equipment.

We also run the risk of having such charges diverted or distorted to become revenue-gathering devices, neglecting their initial purpose as incentives.

The government tends to search for any tools it has at hand to carry out a variety of objectives. If industry or a firm or, less likely, a municipality is giving the federal government a hard time, this tool could be used to threaten the firm or city to comply with some other objective the government is pursuing.

So, I do not favor the use of an effluent fee as a penalty tax. If, however, one could move towards removing some of the regulatory apparatus so a true effluent fee system could become more of an alternative, I think we would enjoy a high level of pollution abatement, with a continuous incentive for innovation.

Effluent Charges to Penalize Industry Delay

Robert T. Hayden

Jack Carlson generally endorsed the concept of effluent charges, but opposed their use as a penalty for noncompliance. Labor approaches those two concepts from exactly the opposite perspective.

In the most general sense, I think you will find that labor will have a reflex reaction in opposition to effluent fees or pollution taxes, particularly as they are perceived as a replacement for the regulatory system.

The notion of using fees or charges as opposed to regulation is not confined just to the water pollution control program. Labor unions are particularly concerned when thought is given to replacing regulations with charges to enforce the Occupational Safety and Health Act (OSHA), and those parts of the Clean Air Act establishing standards and regulatory mechanisms designed to protect public health.

To the extent it appears that we are moving back toward a free market system, or voluntary compliance, labor will regard the proposals as licenses to pollute, or in the case of OSHA, as licenses to injure or even kill in the work place on the basis of ability to pay.

There might be room for flexibility from this opposition with regard to water pollution control. Except for toxic discharges, controlling water pollution involves public health less directly.

In this context, I perceive some room for accepting effluent charge concepts if two conditions are met: Charges cannot replace control of toxic effluents, and can be used only to supplement the regulatory parts of the program, not to replace them.

For this reason, we strongly support the noncompliance penalty as proposed in the last Congress and again this year. Such penalties could enhance administration of both the Clean Air Act and the water pollution control program

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Robert T. Hayden is legislative representative of the United Steelworkers of America.

Our support derives from reasons beyond those advanced in other presentations to this conference. First, labor's greatest concern is job security, the preservation of existing jobs. The present regulatory programs for both air and water pollution control almost invite confrontations over enforcement that include at least the threat of shutting down the plant and losing jobs.

We have found in most cases that the threats are false. They are simply environmental blackmail. I'm sure the Chamber of Commerce has a less negative term for what goes on. Either way, the existing mechanism brings the whole issue to a head, mobilizing the community and the workers against environmental protection.

We see the noncompliance penalty as a means of avoiding that type of confrontation. The charge would let the companies know that they must comply by a date certain, or risk paying a charge equal to the cost they would have incurred had they brought themselves into compliance. That weapon would remove the incentive to approach confrontation in the first place.

So far as workers are concerned, the charge would change the atmosphere, allowing the workers to be more involved in the environmental programs and freeing them to support the programs.

The second reason labor supports such penalties is to avoid stalemates over growth curbs imposed on areas violating health-related pollution standards. The problem has already arisen in the air pollution program.

Do we allow more growth in the areas that have not achieved the health standards? Do we allow more emissions to be brought in? Or do we hold off growth entirely?

EPA has proposed trading-off reduction in existing pollution for permission to admit new plants. Congress is working on it, but ultimately the way to resolve the conflict is to bring the areas into compliance with a margin for growth as rapidly as possible. A noncompliance penalty provision in the Clean Air Act can help stimulate that compliance effort. Such charges could, I hope, prevent similar issues from arising in water pollution control.

Insofar as charges are used to supplement regulations this way, I expect labor support for the concept to grow.

"Insofar as charges are used to supplement regulations . . . I expect labor support for the concept to grow."

Discussion

QUESTION: I get concerned when I go to separate hearings on solid waste, on air, on water. We want a clean total ecological system, and when we break that ecological system down so that one time we talk about air, one time we talk about water, one time we talk about land or solid waste, we are really not getting at the issue.

Suppose we try to impose a standard or a charge on people who discharge an effluent into water. What does the company do? It immediately has to go about installing a "black box," cleanup equipment at the end of the pipe to take the effluent, the heavy metal, or whatever the contaminant is. And what does it do with the metals? It puts them in the air or puts them on the land. Where does it go from the land? Does it stay there or does it go back into the water?

Mr. Carlson, we have heard that we ought to reduce our discharges to the water. I maintain we ought to reduce our discharges to the total ecological system. The way to do so, I think, lies not in "black boxes" but in new production processes that can prevent the discharge into the total ecological system.

Now, industry is faced with an immediate challenge. It has to put in the "black box" because the technology to introduce a change in the process is not yet available and may not be for a long time.

How many dollars is industry going to have to spend for the "black box," the end-of-pipe technology, that might be better spent for reducing the amount of effluent or waste released into the ecological system? How much money that could be spent for research to develop different processes? Wouldn't we be better off taking the millions of dollars that are spent for "black boxes" and spending more of that on research on process changes?

MR. CARLSON: It is true that for a number of industries it is much cheaper to change the in-process equipment to abate pollution. The unit cost would be lower. It is also true, given a 1983 deadline, that many firms feel compelled to follow not the cheaper route, but the more expensive one—best available technology, which tends to be end-of-pipe technology. It is often impossible, for instance, to modify a rolling mill between now and 1983 to respond to new production processes that might cause much less pollution in the first place. The mill is not ready to be overhauled yet, so rather than disrupt its operations, the firm chooses to treat existing effluents.

We have chosen a very costly approach to pollution abatement. We are spending much more for what we receive than we would have if we had relied more on a market apparatus such as effluent fees.

QUESTION: How can we promote these cheaper, cleaner changes? Because we are forcing technology and technology can't do it.

MR. CARLSON: I think we need standards that encourage abatement wherever it is least costly, rather than standards mandating installation of "best available technology." Using BAT, government specifies which technology will be used. I prefer not to have the government estimating what is the best available technology for a particular firm or industry. Make the firm accountable for what goes out the gate, and let it be responsible for choosing the best way to clean itself up. The best measure of appropriate levels of cleanliness would be based upon what damage was caused to individuals, directly or indirectly.

QUESTION: Mr. Carlson, what assurance do we have that there will not be threats of wholesale plant relocations if different fees were imposed on different firms? What assurance do we have that there will be some fairness nationwide?

"... what assurance do we have that there will not be threats of wholesale plant relocations if different fees were imposed on different firms?"

MR. CARLSON: The decision to produce goods in one location and sell them in another is based on a difference of economic conditions. There are advantages in transportation and location, even on a street. A gas station on one side of the street does well, a gas station on the other does not. These different conditions exist, and there is no reason to try to offset them, to equalize them.

If we replace some regulation with fees for damaging discharges, some businesses would find their costs increasing and their comparative advantage in that location diminishing. That is the risk that business is supposed to take, and I would not be concerned by it. There is no reason to equalize such costs across the country. An attempt to equalize costs would produce higher costs and more unfairness than if fees were based upon actual damages associated with discharges.

QUESTION: I believe that the discussion is based upon a misunderstanding of the current permit system. A permit does not specify what technology must be applied; rather, it specifies a discharge level based upon current available technology. No discharger is forced to install any specified technology. Dischargers may in fact choose to change production processes to achieve their discharge limits. In fact, they are encouraged to do so. If they are located on a stream which does not have any additional available waste capacity and they wish to expand their production, that is the only way they will be able to expand.

So the discharge permit does not specify technology. It refers to available technology in determining the level of discharge which will be allowed.

MR. CARLSON: The problem comes in complying by a specified deadline, 1983. The economic life of industrial facilities is maybe 30 to 40 years. BAT-based standards do not take this into account. It would be much better to have a continuous incentive operating on changes in process and in technology change. That is what the current system lacks or even prevents, because it skews compliance efforts in the direction of "black box" technology, available at once.

MR. ALEXANDER: I would like to add to that. I stated earlier that we talk about encouraging process changes. But when you examine what the government actually does, the picture changes. Take the tax

incentives for instance: If you install a "black box," you qualify for investment tax credits and rapid amortization, but if you change your production process, neither applies.

We encounter other obstacles in encouraging process changes. EPA may require a discharger to meet an effluent limit of so many pounds of discharge containing a certain concentration of pollutants. In some instances, a process change will reduce the volume of effluents discharged, but increase the concentration of the contaminant in each pound of effluent. Using BAT, we run into difficulties trying to accommodate this sort of change.

I think it might be well to explain something else here. We frequently refer to "best available technology" in describing the 1983 cleanup requirement. Very seldom do we ever add some key words: The requirement is "best available technology economically achievable," which differs a bit from "best available technology." I think we also forget that there is also a provision in the law to address individual cases in determining the best available technology economically achievable. Section 301 of the law provides that an economic determination be made for particular sources on a case-by-case basis. What may appear to be best available technology economically achievable for an industry may not in fact work for an individual firm; under the law, such firms may only be required to maintain best practical treatment technology economically achievable for them.

"... there is also a provision ... to address individual cases in determining the best available technology economically achievable."

Bearing this in mind might help us respond to the cases cited by Mr. Ruckelshaus, in which BAT posed unreasonable costs.*

MR. BOWER: That is not at all the way I interpreted Mr. Ruckelshaus's examples. What he's illustrating is a class of examples in which, although a particular plant can afford to install BAT, doing so will result essentially in no improvement in ambient water quality.

This is the issue raised by the National Commission on Water Quality and by a number of industries. Whenever this problem arises, we have to question how well the water law rates benefits and costs in trying to achieve its ambient water quality goals. BAT does not help to measure those benefits and costs.

MR. ALEXANDER: I think your interpretation of his examples is correct. There are not now any regulations on how that economic exemption is going to be handled, and there are differences of opinion about how to interpret Section 301. But some people think that Section 301 might address the first case Mr. Ruckelshaus raised. It does not address the secondary treatment requirement facing municipalities, the Seattle case he introduced.

There are even people who think that in considering economic factors under Section 301, you could assess not only the economic ability of the company, but the effect of requiring a firm to move from BAT to BPT.

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*See pp. 9-11.

QUESTION: What proportion of water pollution control might come from end-of-pipe or "black box" technology and what proportion from process revision?

MR. ALEXANDER: I don't have an exact figure, but just from our experience in this region I would say most of our improvement has come from end-of-pipe technology. Even though some discharges in this region have made substantial process changes, I think overall most of the improvement depends on end-of-pipe technology.

"... most of our improvement has come from end-of-pipe technology."

MR. CARLSON: I might add that 10 years ago, the best estimate that I recall was that over half of the improvement would come through in-process changes at a lower, cheaper cost than end-of-process changes, if proper incentives were created.

QUESTION: Certain industries put out effluent containing commercially usable amounts of raw materials, some of them easily reclaimed. Should we be considering a waste tax to try to use incentives to encourage reclamation of raw materials? It can be very difficult to create such an incentive system locally, so perhaps the federal government could institute it for strategic raw materials or materials imported from unstable countries.

MR. RUSSELL: Such a tax is really the same thing as an effluent charge. Some raw materials, such as heavy metals, are substances that should not be discharged anyway, so if you subjected such discharges to an effluent charge, you would, in effect, be putting a waste charge on the materials themselves. The same thing is true for many of the residuals that we would rather not have floating around in the environment.

It is a fine idea, whatever you call it. In principle, at least, the practical problems of instituting it locally are only slightly different from the practical problems of instituting anything like this at any level of government, as far as I can see.

MR. HAYDEN: I think the problems of implementing such charges are far greater at the local level than at a national level.

I think the intent of the question echoes an earlier question about national uniformity in control programs, as opposed to regional or local application. Unless there is fairly uniform application nationally, you do encounter the specter of company flight, the job loss, and for that reason labor has supported national standards in all of these programs. Without them, localities cannot act on their own.

QUESTION: Earlier, Mr. Carlson suggested that the delayed compliance penalty would be ineffective, or at least it would not strike the intended target, because it would be passed on to consumers or perhaps used to suppress wages.

It seems to me that this would not occur if many companies that had already complied were not paying the penalty imposed on the laggard firms. By being in compliance, they would avoid paying the charge, and so could compete better against the companies being assessed. The complying firms would not need to raise their prices to

the consumer or lower the wages they could offer to unions. Wouldn't these constrain the ability of the offending firms to pass the charge on to consumers and employees?

MR. CARLSON: As Mr. Ruckelshaus pointed out, 60 to 90 percent of firms are in compliance, compared to only 25 percent of the municipalities.

The remaining 10 to 40 percent of firms are the worst cases. Presumably they are going to be the toughest cases to handle, for some perfectly legitimate reasons. If the worst case is taxed, chances are that the firm will pay the charge rather than abate polluting, so the charge will be added to costs. The elasticity of the end product in a competitive market situation determines whether the cost is borne by the consumer or labor. Labor cannot push beyond the competitive product market situation, so it is constrained in winning wage increases unless the union wants to suffer unemployment.

"The elasticity of the end product in a competitive market situation determines whether the cost is borne by the consumer or labor."

QUESTION: In other words, the impact of the tax will depend on the price elasticity of demand for the product and the competitive situation in the particular industry or market?

MR. CARLSON: Yes. So you are faced with the tax being passed on to the consumer and back on to labor if a noncompliance charge is assessed on top of the existing regulatory scheme.

MR. RUSSELL: Obviously, all of the costs will be passed through eventually to all of us as consumers and owners of the capital and labor services that we sell. There is no one else to pay these costs.

MR. BOWER: I would like to ask about the figures used to describe compliance, at least in EPA Region V. We have heard that 60 to 90 percent of industry has met the July 1, 1977, BPT standard and that 40 to 60 percent of the municipalities have.

I do not know what that means. If it means, as I suspect it does, that certain capital has been put in place or will have been put in place by July 1, 1977, that is one thing. It does not tell us how many dischargers are meeting the 1977 standards just because their permits say they shall be discharging so much. I suspect that we don't even have sufficient information to be able to say whether 60 percent, 40 percent, or 90 percent, or 10 percent of industry is meeting or is not meeting those standards.

To what extent can you say what proportion of industries in Region V is actually meeting those standards day after day.

MR. ALEXANDER: Eighty-five percent of companies, by the number of companies, are either in compliance with their effluent limitation or are on schedules to come into compliance by July 1. The remaining firms are the big ones, which account for a large proportion of total discharges.

I do not know what proportion of companies are actually in compliance with their effluent limitations on a daily basis. I can't tell you because we don't monitor every one of them. But I can tell you that a lot of violations are reported just from firms' self-monitoring. I

would say that only 10 percent meet the standard every day. Forty to 50 percent of municipalities are in compliance, not just with the permits issued them, but with the goal of installing secondary treatment.

MR. BOWER: It is important to be sure that everybody understands what is meant by the term compliance. It means compliance with a schedule of construction, not necessarily compliance with the amount of materials permitted to be discharged into a stream.

Connecticut's Experience with Noncompliance Penalties

Douglas Costle

I want to share some of my thoughts about the advantages and disadvantages of some old and new ways of dealing with environmental problems, particularly the relationship between water quality and effluent charges. I want to make it clear that I am speaking from my own viewpoint and that of the Environmental Protection Agency, rather than for the Administration.

The last decade has seen a sustained concern for the quality of the environment. This concern has been expressed in an unprecedented series of federal legislative initiatives. The Clean Air Act, the Federal Water Pollution Control Act Amendments of 1972, laws on pesticides, solid waste management, and resource recovery, drinking water, and now finally the new toxic substances act.

I believe that with a few major exceptions this era of major legislation is probably drawing to an end. Increasingly, we are getting involved in trying to make these laws work.

The first phase of that job is drawing to an end. In the water program, the majority of individual and municipal polluters have begun to comply with the law. Control equipment is being installed and manufacturing processes are being modified to produce greater efficiency and less pollution.

Douglas Costle is administrator of the U.S. Environmental Protection Agency. He was commissioner of the Connecticut Department of Environmental Protection.

As prescribed by Congress, the role of the federal government in this cleanup is to set the initial rules of the road in the form of standards and regulations, and then to ensure even-handed enforcement so that no regulated individual interest obtains an unfair advantage over other competitors.

In trying to enforce the law, we became aware of the limits of tools available to us under traditional administrative processes. When a regulating agency challenges a violator, it has only two basic strategies from which to choose: jaw-boning or going to court.

Both are often unsatisfactory, and both can result in inequities. Delays can give a violator an economic advantage over companies which have obeyed the law and invested in equipment to clean up pollution. Continuing pollution and protracted administrative and judicial proceedings are costly to both consumers and taxpayers.

Economists have advocated a solution to the problem of obtaining compliance. There is a growing interest in the use of effluent charges as an economic incentive to reduce pollution.

Effluent charges in theory offer a number of advantages. An emission source pays to discharge effluent into the water. The charge is set at a level that makes it economically advantageous to clean up discharges to some desired level.

But the concept also carries some clear disadvantages in my judgment. One of these is the fact that it does not make use of existing administrative mechanisms and resources.

In 1972, when I became administrator of the environmental pollution control program in Connecticut, the state agency began to look for hybrid enforcement tools. We did not have the resources, enough information or manpower, to design and implement an effluent charge system effectively. But we wanted to find a way to *supplement* existing regulatory tools with an economic incentive, and we wanted to use the businessman's economic self-interest in minimizing cost and maximizing the efficient use of his money.

What we came up with was an administrative program of assessing civil penalties for noncompliance with environmental standards and regulations. Our system grafted this economic incentive onto existing processes and resources. We sought and received legislative authority that enabled the agency to assess fines for failure to comply with environmental laws, and we devised a system for pegging the size of such fines directly to the dollar savings enjoyed by deferring compliance, rather than to an arbitrary fine schedule.

Essentially, in every individual instance of noncompliance, the charge is calculated by using the same formula that businessmen use to evaluate alternative investment opportunities. The costs of compliance are estimated year by year over the life of the required control technology. These estimates are adjusted for taxes, for inflation, and for the cost of capital required to purchase such technology. This total cost is then broken down into a flat monthly rate that will amortize the compliance cost over time.

Connecticut's Experience

An individual pollution source is first warned of its liability; then, if it continues to violate standards, the calculated monthly fine is assessed.

This hybrid enforcement tool is receiving increasing national attention. Several states are in the process of adopting it to conform with their own state laws and programs. And Congress itself is showing strong interest. In fact, if last year's Clean Air Act had not been killed by a filibuster, a federal civil penalties program would be in place today. As Congress considers the water legislation this year, there will be proposals to incorporate such a program into water pollution control amendments.

During the next four years, EPA will have to give increasing attention to ensuring that the dischargers maintain and operate control equipment they have installed. We are now examining the usefulness of tailoring a civil penalties program to some innovative use of surety instruments: bonds to guarantee performance. It may be possible, for example, to devise a system that will allow the agency to require flagrant violators to install and maintain continuous monitoring systems. Such a system could monitor either the operation of the control equipment or compliance with operating parameters such as temperature, pressure, or water flow.

But in truth, we are just beginning to deal with issues of operation and maintenance, and we will need the cooperation of all parties concerned, particularly the business community, if we are to deal successfully with the program.

". . . business and industry can and will support responsible, reasonable, and efficient pollution control programs."

From my experience in Connecticut, I learned that business and industry can and will support responsible, reasonable, and efficient pollution control programs. I believe the American business community by and large has accepted the need to clean up the wastes produced in our highly industrialized society. What the business community wants is assurance that the government will be fair and even-handed, so that competitors will not obtain economic advantages through tardy compliance or any other dodge.

I am not not recommending national adoption of the Connecticut civil penalties approach as the only viable solution. But I am suggesting that similar innovations in the regulatory process will increasingly be a part of our national debate as we try to make these laws work, as we try to refine them, and as we make mid-course corrections in the applications of these laws.

Discussion

QUESTION: I take it that you are contemplating coupling the noncompliance penalties with the present permit system. These permits are written in terms of monthly average daily maximum discharges not to be exceeded, and specify some 10 to 15 parameters. What would constitute noncompliance?

MR. COSTLE: There are several problems with trying to couple noncompliance fees with the system as it now works. Not the least of these is continuously monitoring what are the actual discharge rates.

It is rather simple in terms of trying to get the initial equipment installed. Ensuring compliance in operation and maintenance is obviously far more difficult. Perhaps using a surety instrument would be a more fruitful approach. For example, in case there were some repeated violation, we could require posting a bond or some percentage of a bond to provide an incentive to improve compliance. Perhaps it could be devised so that the bond could be called if there were no clear improvement in operation and maintenance.

We are only now beginning to see the front end of the operation and maintenance problem.

QUESTION: Should noncompliance be determined by a state if permit authority has been delegated to it?

MR. COSTLE: I would think so if authority has been delegated. There were 12,000 sources of air pollution in Connecticut, for example. The state can only effectively deal with a fraction of them at any given time. Continuous federal monitoring would be even less possible.

As more and more companies come into compliance, the federal role becomes focused on oversight in the most important cases.

QUESTION: How would you assess noncompliance penalties? Current laws providing for civil penalties set out fines such as $1,000 per day of violation and $10,000 for violating the act in the first place. Can you describe some of the cases in Connecticut to give us some sense of the penalties?

MR. COSTLE: In Connecticut, we established a formula to calculate the penalty for us. The size of the penalty is not arbitrarily prescribed in statutes or regulations. Instead, it is based on a simple, easily computed formula. A state official can calculate the whole fine schedule in 20 minutes. The formula is based on taxing away the opportunity benefit that a polluter enjoys if he delays complying with the law. It is precisely calculated to recapture that amount, so businessmen, we found, would consider the penalty and realize there was absolutely no economic incentive in continuing to delay.

"The size of the penalty is not arbitrarily prescribed in statutes or regulations. Instead, it is based on a simple, easily computed formula."

Then the issue becomes one of determining whether enforcement orders that had been issued were, in fact, reasonable. Our limited experience with the program to date indicates that the orders were reasonable. Six major polluters in the state had been notoriously recalcitrant; in one case we had been fighting them in court for six years. Literally within the week that the first set of regulations were issued, they came around. We devised a timetable, and they made it.

So the penalty provision had a rather dramatic effect even though the calculated civil penalties did not involve large sums of money. The penalties made it clear that there would be absolutely no economic advantage in delaying.

Then also, because the fines are calculated on the estimated cost of compliance, they made people estimate their costs more seriously. Before the penalties, companies would insist that it would cost $10,000,000 to fix their problems. We would reply, using the penalty provision, "Then your fine will be calculated on that." And the estimates quickly came down.

We also provided an opportunity for adjusting the penalty levied once compliance was completed, based on the actual cost of complying as shown by vouchers or acceptable recalculations of the cost. The program, in other words, was designed to tax the necessary amount, no more or less, to tax away what we began to call the opportunity benefit of delay.

There is probably no system without flaws. But this one had a rather remarkable effect on the whole nature of our discussion with dischargers. It certainly gave businessmen an incentive to reconsider delay, knowing what they could otherwise expect.

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